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SIR RICHARD PAGET

(Who propounds a new theory of the Origin of Language in this issue)

PSYCHE

JULY, 1927

EDITORIAL

ORTHOLOGY

What will be the next great step in Science? That is a question which humanity asks itself every little while, but of recent years the answers have become more and more stereotyped. New rays, new antitoxins, new sources of power, new celestial bodies, some further annihilation of space, some fresh vista in psychology, —to all these we have grown accustomed, and it is the pleasant duty of the chronicler to record them as they occur.

Yet as the psychologist looks back over the history of intellectual achievement, we see that all these discoveries have followed in the wake of other more significant advances, promising a more fundamental mastery of mystery, connected with the underlying technique,—of symbols.

THE SCIENCE OF SYMBOLS

The first animal who deliberately used a sign as a symbol has the best right to be called the first man. A sign is something which we interpret as meaning something else. Wells mean water. A symbol is selected to mean something else, for convenience. H_2O shall mean water. When, therefore, symbols were added to man's tools he got a full lap ahead, and he has never lost his lead, though the use of the term " meaning " often cramped his style. !

When writing with symbols was achieved, he mounted his machine, Science, the record and communication of organized knowledge; and a third stage was reached when algebra provided the oil for the wheels of his machine. Thereafter the special sciences, each with its own symbolism, its special language or notation, leapt so rapidly forward that they soon forgot what they owed to the invention of symbols. Confusions due to the misunderstanding of the nature and function of symbols produced a variety of strange problems which it was nobody's particular business to unravel. Notations,—special languages for mathematics, music, chemistry, and so forth,—developed independently of one another. The machine got out of hand; its parts were mistaken by the near-sighted for portions of the external world which it was designed to control; and to-day its creaking is very evident to all who will stop, look, and listen.

Consider the terms in which our most vital problems are discussed. They were the creation of beings living in conditions not far removed from those of the higher apes, hunters and trappers primarily concerned with jungles and jaguars. The structure of our languages has not changed for thousands of years. Its crudities were standardized by Aristotle in a grammar and a logic which have effectually prevented us, until yesterday, from either avoiding the most futile arguments, or realizing the bearing on our lives of the outstanding discoveries of the last five centuries.

How Words Work.

The science of linguistics now suggests that many of our most cherished beliefs, and most of the so-called concepts and abstractions from which our controversies arise, are of purely linguistic origin, due to mistaken verbal analogies and the objectification of symbolic accessories (parts of speech). The psychology of symbols enables us to realize that we are constantly confusing the two uses of language, the *symbolic* (when we refer to things) and the *emotive* (when we arouse emotions), and that though we may suppose ourselves to be conveying facts we are often only expressing emotional attitudes towards them. The modern theory of communication reminds us that unless we distinguish on all occasions between the word (or symbol) the thought (or emotion) and the thing (or referent), we may fail to communicate and be unable to understand.

Psychology has also revealed how prone we are to project the creatures of our fancy, the hallucinations of our fevered brains and the fictions which Vaihinger discusses in his *Philosophy of As-if* into the world outside our skin. It showed that as we project emotions and colors into the external world or warmth into the fire, so logicians project number symbols into imaginary timeless realms or ascribe " properties " to logically subsistent " propositions '; so that mankind has been perpetually agitated by the false problems of existence and reality, purpose and mind, which constitute the stock-in-trade of philosophers.

THE WAY OUT

Gradually a body of evidence accumulated. A new science of Symbolism worked on the elements of communication, of linguistic psychology and the meaning of symbols. It scrutinized the meaning of the vague term "meaning" and found that it had no less than sixteen distinct uses. It showed that an antiquated grammar was a grave offender in perverting the minds of the young, while neglect of grammatical principles left them a prey to charlatans and rhetoricians. It developed certain canons of interpretation, definition, and communication which opened the way to a reconstruction of grammar and a study of the principles of notation itself.

It is along these two lines that research is now most needed. But meanwhile the foundations of Aesthetics were laid by removing the verbal debris which had cluttered up the discussion of Beauty. I. A. Richards clarified our notions of value in general and particularly in literature in his *Principles of Literary Criticism*. Mortimer J. Adler, in his *Dialectic*, is examining the readjustments required in the verbal formulae of a discussion before fresh facts can profitably be dealt with. Dr. Scott Buchanan has distinguished in his forthcoming study of *Possibility*, the kinds of alternative notations available for any group of facts, and has inquired when languages (symbol systems) are equivalent, when they can be translated by expansion, and when they are incommensurable ; while Stefansson has spent seven years in the Arctic considering the special possibility that most questions are begged by the form in which we ask them.

IOPE VERSUS DOPE

In these respects, then, the study of language is an eye-opener, and could its findings be presented to the world in concentrated form it would provide the only possible antidote to the verbal dope that is at present destroying the natural American sense of values. Essence of Eye-opener (Iopė), should, indeed, be on sale at every educational institution from the Child Clinic upwards, in the form of graded linguistic vade-mecums, corresponding to the grammars of the Middle Ages in which the verbal experience of ten centuries was stored in an orderly form. These would culminate in that substitute for 99 per cent of current philosophy, 80 per cent of current logic, and 50 per cent of current philology + literary criticism, which so many educationists are asking for.

It would be the object of such handbooks, at any rate for the next few centuries, to provide an antidote to the poisons which have slowly been undermining man's sense of position and direction. Names would be found for the various perils which beset both speaker and listener, some of which have already been classified by experts. Thus we have *Irritants*, the words which in any particular discussion are sure to generate friction. " Unnatural " is a good example of one type of irritant. Equally in need of classification are *Mendicants*, terms which call for a little charity and have no fixed resting place,—such as " genius " ; and *Nomads*, like " reality ", which cannot be dispossessed except emotively and whose home town we try to raze in vain. Even more pernicious are the subterfuges, the Phonetic, the Hypostatic, and the Utraquistic, which can be practised with " desirable ", " Democracy ", and " perception " respectively.

AN ORTHOLOGICAL INSTITUTE

Once equipped with the preventive technique, the young man, and sometimes even the young woman (though here a more violent cathartic might be necessary) would soon recognize the need for an entirely new " subject " in the curriculum. Just as, for example, economics and genetics have slowly won their way into the universities and are themselves now subdividing, so we must gradually secure chairs for a dozen or more branches of orthology. We cultivate orthography in writing, and orthophonic enunciation in speaking ; we recognize orthodoxy even if we are heretics ; we send our children to orthopaedic institutes. The idea of an Orthological Institute, where our errors in manipulating the logos may be corrected by the science of orthology, is one for which the twentieth century is ripe. In this case, however, the new science is crystallizing at the expense of a number of moribund but extremely tenacious pseudologies which can still rely on their appeal to ingrained linguistic and emotional habits dating from savage epochs.

But in addition to reinterpreting and correlating the old fog signals, the new knowledge which is pressing for application constitutes an expanding nucleus of emergent material. Indeed its recognition has only just become possible, owing partly to the development of comparative philology and more especially (as we have already seen) of psychopathology at the end of the nineteenth century, and partly to the triumphs and confusions of mathematical symbology in the early part of the twentieth. As long as men believed in the unique position of one language or one grammatical structure, as long as they could not compare the tricks played on them by their own verbal machinery with those by which others with a quite different machinery were also victimized, so long was it almost impossible to suspect the universal ravages of word-magic.

Occasionally an outstanding genius, an Occam, a Hobbes, a Locke, a Leibnitz, or a Bentham, labored for a lifetime to secure a momentary vision whose significance he tried in vain to convey to his contemporaries; occasionally too a sceptic or a humorist, such as Antisthenes, Aenesidemus, Hume, Horne Tooke, or Mauthner amused himself at the expense of his more logolatrous contemporaries or exploded with indignant acerbity. But for the most part they spoke as the illuminati to Plato's cavemen, or as the psychiatrist who learns not to argue about illusions in the asylum: it is precisely fishes who fail to realize the remarkable humidity of water, though humidity itself is nothing but a notion.

POSSESSION AND THE LAWYER

Suppose that you are an official in charge of a hospital where from time to time patients go so far out of their minds that they are beside themselves, and that in this state of paranoia they kill others who are beside them. Your wife urges you to insure your life against death or injuries inflicted. You do so, and are promptly shot dead by a paranoiac; whereupon your family, left without visible means of support, come forward to collect the provision you made for them in case you should fall victim to one possessed.

The insurance company, however, may reply that the injury was not " inflicted " and if the case went to court it might be found that they were right. At any rate, if you were domiciled in America, the judge could refer you to 284 S.W.R. 216, adding that in his opinion also the meaning of the word " inflict " excludes the actions of insane persons. The insane cannot " act " in the eyes of the law, and any one who inflicts an injury " acts ". They cannot act, say the lawyers, because they " do not have a purpose in mind. Their mind is gone."

As to the further point, whether when you are out of your mind it is your mind which has gone or you, the law has not yet decided. But at every turn lawyers, judges, and legislators, entirely untrained in the analysis of " meaning ", are to-day confronted by similar intricate problems of the interpretation of words with which they are quite incompetent to deal. Meaning is determined throughout the legal world on different principles by different judges, and very few jurists other than Professor Hutchins of Yale, Dean Roscoe Pound of Harvard, and Professors Ehrlich and Wurzel have shown any appreciation of the disconcerting issues involved. Ehrlich's

Juristische Logik and Wurzel's *Juristiche Denken* which develop the suggestions of Kantorowicz and Ihering are amongst the first works which the proposed Orthological Institute would make more widely known in English.

Meanwhile, though Rignano's *Psychology of Reasoning* might have put them on the right track, analytical jurists, whether dealing with possession and its psychological implications or with possessions and their more concrete attributes, continue their fantastic efforts to make one popular word always mean the same thing. Hard thinking on the part of the judge, they assume, can be avoided. In England, however, there are already signs of a return to Bentham, the great thinker who more than a century ago based his proposals for the reform of legal methods on his profound analysis of grammatical tricks. As a leading authority on jurisprudence remarked to me on reading the proofs of the above: "Orthology should certainly be recognized as one of the most vital issues in the science of law."

THE DOCTOR IN THE DOCK

The backward state of law, then, is chiefly due to the slow progress of linguistic method in jurisprudence; for in spite of the acuity of the brain-work which takes advantage of the law's delays or grapples with its complexities, lawyers as a body have been surprisingly out of touch with developments in symbolic procedure. Their awakening, therefore, will probably be preceded by that of the doctors, for many of the leading representatives of medicine are now urging on their colleagues the need for a study of words and symbols.

In many separate fields the future of the healing art is now awaiting help from linguistics. Most obviously in psychiatry, where the work of Freud has given special impetus to the study of "symbols," by showing that no dream descriptions and few forms of human behaviour can be taken at their face value. Interpretation is required before their "meaning" can be understood. The efforts now being made by Dr. H. S. Sullivan, Dr. Jelliffe, Dr. White, Dr. Parker, and Count Alfred Korzybski to relate this symbolic approach to the more general psychological study of meaning are revealing the importance of a better understanding of symbology in all forms of mental hygiene and aphasia.

Secondly, we are faced by the persistence of word magic in all branches of medicine which treat diseases as entities whose causes can be discovered by laboratory research. The late Sir Clifford Allbutt long fought in vain against this misconception of bacteriological discovery, but Dr. F. G. Crookshank has succeeded in convincing many of his colleagues of its baleful effects in medical education, where verbal formulae often regain the ground which they are popularly supposed to have lost forever at the end of the scholastic era.

Or take a more special case, again involving life and death. For generations the science of brain-anatomy has been held up by a purely verbal confusion. As Professor Piéron in his brilliant work *Thought and the Brain* has now clearly established, surgeons have constructed an imaginary anatomy on the basis of the imaginary entities of the early psychologists. Every one, in fact, was misled by the habit of talking about "intelligence", "memory", "attention," and so forth; and when brains were first cut open by modern surgeons they endeavored to locate these functions and set them right. Small wonder that patients died under their ministrations, much as a machine might be put out of action if some practical verbalist endeavored to poke at its "speed" or its "output", on the supposition that such entities, since they can be talked about, must be localized in some special part. The similar verbal illusions which have led to the absurd search for "beauty" in a picture, or for the cause of esthetic emotion in "significant form", have fortunately been responsible only for a waste of lives and not of life!

The Future of English

In a variety of sciences, then, the next step forward can be taken only when orthology has been developed to meet modern needs in notation, translation, and grammar. Many branches of physics, as the relativity controversy shows, have reached an impasse where rival symbol systems need to be integrated. Musicians have evolved a rather unsatisfactory notation, whose development at least made orchestration possible, but colorists are still groping for guidance. The services of mathematicians and psychologists, and of cipher and code experts as well as philologists, are needed before the principles of an international or an ideal language can profitably be determined.

The work of Sir Richard Paget on the origin and technique of speech, and of Piaget, Lorimer and Markey on the language of the nursery, must be supplemented by studies of the parallel Oriental material and of the felicitous elasticity of mechanics and publicity in the New World.

Is the English Language itself progressing along the right lines? With a few months of cooperative research we might discover; otherwise we may continue to drift along for centuries. Never has history offered such an opportunity to an enlightened philanthropist.

THE NATURE OF THE COLOUR SENSATIONS

By CHRISTINE LADD-FRANKLIN

Helmholtz was a great psychologist as well as a great mathematician, a great physicist, and a great physiologist.[1] If his work[2] were to be brought out now for the first time it would undoubtedly be called Psychological Optics instead of Physiological Optics —there is far more of psychology in it than there is of physiology, and the psychology is (for the most part) of an extremely acute, as well as of a highly original kind. Organized (non-philosophical) psychology was not definitely in existence when Helmholtz began issuing this book (1856), and he is, very properly, regarded as one of the first investigators in this field. It is, therefore, one of the most inexplicable of psychological occurrences that so great a scientist paid no attention whatever to the fact that, while the necessary *stimuli* for all the colours in the spectrum (and in the world) can be secured by appropriate mixtures of only *three* wave-lengths, the distinct, different, *sensations* that result are not three in number but five—yellow and white are just as good, just as unitary, light-sensations as are red and green and blue.[3] The things to be accounted for, then, in a theory of the visual sensations are, in the order of their phylogenetic development, a primitive achromatic sensation, the dull whites, and *four* chromatic sensations, first yellow and blue (the bees) and then red and green in addition (normal tetrachromatic vision); it may, therefore, be said that the Young-Helmholtz theory is at most three-fifths of a colour theory—it recognizes the existence of three out of five of the actual sensations. But also it takes no account of why the chromata[1] are developed in this peculiar way in pairs: first *yellow* and blue (although yellow does not exist in this theory)—later red and green. (It is also in this order inverted that the colours are lost in the case of diseases of the eye—tobacco amblyopia, progressive atrophy of the optic nerve—and also restored if the disease is recovered from.) Still less has it occurred to the adherents of this theory to pay attention to the extraordinary fact (absolutely unique in the whole range of the sensations) that these very colours constitute "disappearing" colour-pairs[2]—that no human being has ever seen a red-green or a yellow-blue—though he would be very much surprised if he failed to see, on the other two sides of the colour-triangle, the blue-greens and the red-blues, or, in the taste sensations, *all six* of the possible blends, two and two—the bitter-sweets, the sweet-acids, etc. The theory is therefore in absolute contradiction to the first of the admirable "axioms" enunciated by Professor G. E. Müller—that in correlation with every distinct sensation some distinct physiological (cortical in the last instance) process must be assumed to exist. To suppose (as v. Kries does) that for no assignable reason a three-fold process in the retina turns into a four-fold process in the cortex (or conversely, as Donders does) is to make admission of a fact, but does not provide a theory to account for it. Not everybody is interested in hypotheses (theories); some are content with a plain diet of fact. But it is well-known that successful theories of complicated occurrences in nature are not only intellectually satisfying but also most important as guides to further investigation.

---

[1] It happens that his predecessor in the construction of a theory of the colour-sensations, Thomas Young, was also a man of the first distinction in half a dozen different branches of learning.

[2] The following article will form an Appendix to the English translation of Helmholtz *Physiologische Optik*, edited by Professor Southall, and obtainable from Prof. Richtmyer, of Cornell University, at 30/- a volume.

The writer, as everybody knows, is particularly well qualified to discuss this subject. On eo the sessions of the International Congress of Psychology in London, in 1892 was devoted to new theories of colour sensation. That evening the papers which had been read in the morning were being discussed privately by a group of scientists of whom Helmholtz happened to be one. He had spoken rather disparagingly of one of the contributions, when somebody asked him what he thought of Mrs. Franklin's colour theory. " Ah," said Helmholtz. " Frau Franklin, —*die* versteht die Sache ! "—ED.

[3] Black, as Helmholtz recognized perfectly, is a definite sensation, but it is a constant, permanent, background sensation, which becomes evident and forms a dual blend with any of the colours—not with white only—when they are faint. It is a non-light sensation and it belongs in a totally different category from the light-sensations. Its function I have given a theory for (see *Dictionary of Philosophy and Psychology*, II, Art. *Vision*, p. 767, and *Psychological Review*, November, 1924.).

Our ancestors thought that redness resides in the rose. They had, very naturally, no conception of the fact—now a commonplace of science (save for the physicists)—that there is no redness until specific light-frequencies have passed through the alchemy of the retina (and not always then—some persons, though they can see, are totally chroma-blind). That Helmholtz himself should have used the word "colour" in its primitive, objective, sense is singular in the extreme; two successive sections of his book are called *Die einfachen Farben* and *Die zusammengesetzten Farben*, when what he is discussing is respectively homogeneous (or pure) and non-homogeneous (or mixed) light-rays. A blue-green sensation-blend may come from a homogeneous beam of light, and on the other hand a unitary yellow sensation may come from a mixture of "red" and "green" lights. While this use of the word "Farben" is a mere momentary inadvertence on the part of Helmholtz—he puts the matter in the third volume of this work (§ 26) in perfectly strict scientific terms—that is far from being the case with most of the physicists who write on colour at the present time, *e.g.*, with Sir Oliver Lodge, Barton, Joly, Peddie, etc. This is all the more strange when it is remembered that Newton (no one, indeed, before him had made this discovery) says plainly: "The rays, to speak properly, are not coloured. In them is nothing else than a certain power or disposition to stir up a sensation of this or that colour . . . . So colours in the object are nothing but a disposition to reflect this or that sort of rays more copiously than the rest."

---

[1] I have urged the introduction of this name, *chroma*, in the sense of *colour proper*, *getönte Farbe*, since 1913, in order to obviate the hopeless ambiguity that results from using "colour" in a double sense—now including and now excluding the achromatic sensations.

[2] The term "disappearing" colour pair is very necessary in order not to prejudice the mind of the reader, at first, as between the Hering conception (antagonistic chemical processes) and mine (that of *constituent* chemical processes). Still less is "cancellation" (Troland) a permissible term for this, unless one has definitely adopted the Hering theory.

Moreover, it is to be noted that in the original theory of Thomas Young it was the *physiological* difficulty of imagining a sufficient number of tuned retinal fibres for all the rays of light, in accordance with the view of Newton—"vibrations running along the aqueous pores or crystalline pith of the capillamenta which pave or face the retina"—that led him to substitute a three-part mechanism, with an *overlapping* in various proportions for the intermediate blue-greens, etc.[1] Unquestionably, Thomas Young would never have called this hypothesis of his (a limited-number-of-constituents-hypothesis) a *trichromatic* theory, nor (what is no improvement) a triple " nerve-excitation theory."

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[1] It would seem to be impossible for the physicists to realize that when once light has struck the retina, wave-lengths cease to exist—that their place is taken by *three* initial chemical products and *mixtures* of them. Thus no interest attaches to a pair of complementary *wave-lengths*. When red and blue-green, or green and blue-red, or blue and yellow (that is, red-green) mixed in the required proportions, make white, what we have is the fundamental Young-Helmholtz fact that white can be made out of the three physical constituents, red and blue and green. (Yellow does not need to be put in separately —yellow is a secondary chemical product that forms itself. See my theory, to be given presently) A simple consideration of similar triangles (in the map of colour sensations in terms of trilinear cöordinates) will show that lines drawn through the whiteness-point will meet the spectral line in points such that their severally combined red and green and blue constituents willl be in the correct proportion for making white. I have, therefore, to aid this process of thought, proposed the use of the term "transformer mechanism" (plainly adumbrated, as above, by Thomas Young) to accentuate the immediate change that takes place as soon as light performs its initial (photo-chemical) work upon the photo-aesthetic retina. There is everything in having a name when things are in danger of being overlooked.

It is for all these purely psychological reasons that the psychologists have never been able to regard the *colour-theory* of Helmholtz as deserving of serious consideration. (The fact that Helmholtz gave no physiological explanation of what v. Kries[1] has lately furnished a much-needed name for, namely, the " accessory " visual phenomena, is of far less consequence ; the recent finding of Fröhlich, *e.g.*, that contrast is simply an after-image of scattered light, would fit into any hypothesis regarding the fundamental process of the colour-sensations.) In fact, Professor Cattell has said of this theory (in the review already quoted from) that " if it were to be proposed at this time (1898) it would not have a single adherent. William James said that Helmholtz is, in the science of colour, more eminent for his experimental work than for his theoretical contributions ; but it has been pointed out, on the other hand, that the *Physiologische Optik* was the work of his younger days. In any case the physicists ought surely to take notice of the fact that the psychologists, who are experts in questions of *sensation*, find that the Helmholtz theory is wholly inadequate.

II. THE HELMHOLTZ—KÖNIG FACTS OF COLOUR SENSATION

But however inadequate the Helmholtz theory may be for explaining the characters of the chromatic sensations—however certain it may be that (1) vision is tetrachromatic, (2) that it has undergone a remarkable and a perfectly well made out course of development, namely—(a) white, (b) yellow and blue in addition, which however revert to white, and (c) the addition again of red and green, which revert, when mixed, to yellow,—nevertheless the result of the great work carried out in the Helmholtz laboratory by König and his assistants is plain matter of fact. It is indeed the most fundamental of all the facts regarding the colour-processes. However, it is not a fact regarding the *sensations* of colour, but only regarding the initial, photo-chemical process which starts up conditions resulting finally in sensation. Colour vision is not *trichromatic*, but it starts up (in the cones) with an initial " tri-receptor " photo-chemical process.

The distribution-curves of the (four) chromatic sensations which represent the theory of Hering are all purely the work of the imagination, and so are the first tentative curves of Helmholtz (still too frequently reproduced in the books). But the situation is very different when it comes to the later curves, which represent what I may call the Helmholtz facts. These curves are drawn in accordance with the results of a vast number of observations in the game of "matching by mixtures"—the demonstration, by the eye, that all the colours of the spectrum can be matched by physical mixtures of red, green and blue lights. When one-half of the field of view of the great Helmholtz instrument for mixing specific light frequencies, the *Farbenmischapparat*, is filled with a combination of two different lights and the other half with a homogeneous light, or a different light mixture, or white light, and if the proportions and the character of the several constituents are varied until the two half-fields are indistinguishable, we are said to have before us a colour equation.[1] The results of these measurements are mapped in a *colour-triangle* (what the metallurgists call a triaxial diagram) —a very natural plan for representing (proportionally) by trilinear coördinates functions of three independent variables. The three distribution-curves picture the same facts by means of a different system of representation. But it was only after the incorporation into this work by König of the results of the equations made by the partially chroma-blind that it acquired its present immense significance.

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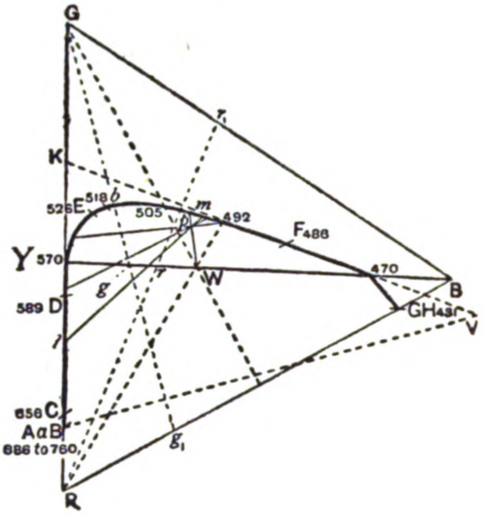
[1] *Allgemeine Sinnesphysiologie.*



(The Colour Triangle (König).

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[1] The instrument provides also for the throwing of measured quantities of white light upon either field at pleasure. An improved model has been put on the market quite lately by its makers, Schmidt and Haensch of Berlin. Other equivalent means of securing the same results are now in use in this country.

This triangle should always be drawn with the yellow-white blue line a fundamental (that is, a horizontal) line, as representing the fact that the yellow and blue system of sensations (that of the common form of partial colour blindness, of the normal human mid-periphery, and of the bees) was the first to be developed.

When it came to deciding what wave-lengths to take for the independent variables in this work of matching by mixture, the choice was a difficult one for green (the two ends of the spectrum were naturally chosen as a first trial, for red and for blue). In the lack of any determining consideration for this choice, a green was taken somewhat at hazard, and tentative curves were determined. (König's names for these curves and for those which later replaced them, "*Elementarempfindungen*" and "*Grundempfindungen*," are without present significance). Just at this time it happened that it was possible to secure four individuals who were trained observers, and whose vision was dichromatic (two of each type). Would their curves show any coincidence with the curves of the normal eye? It turned out that while the *blue* curves of these defectives coincided with the blue curve of normal vision, the other two curves (both *yellow* in quality, it cannot be too often repeated) were markedly different. But would they perhaps have coincided if some *other* independent variables had been chosen? The question is easily put to the test: it is a simple matter of mathematics (merely a change in the vertices of the triangle of reference) to find out if there are independent variables, that is, unit quantities of lights of particular wave-lengths, such that the entire spectrum as seen by the three classes of individuals (the normal and the two types of defectives) can be built up out of like amounts of two or three of the several constituents—that is, are such that their curves do actually coincide. As a matter of fact König and Dieterici (König, *Gesammelte Abhandlungen*, p. 317) found that it was only necessary to make the following substitutions for the colours first chosen to disclose complete coincidence.

$$\mathrm{R} = \frac{R - 0.15G + 0.1\,V}{0.95}$$

$$G = \frac{0.25\,R + G}{1.25}$$

$$B = V$$

The colours thus fixed upon are (1) a red less yellowish than that of the spectrum, (2) a green of about $505\mu\mu$, (3) a blue of about $470\mu\mu$. To repeat constantly that "these stimuli correspond quite closely with three of the fundamental physiological primaries of Hering" (*Colorimetry Report* 1920-21) is to commit a sad error... The *Urfarben* of Hering are complementary colours and therefore cannot be the same as the colours of the König curves. König and Hering both are perfectly explicit on this point (Pflügers *Arch.*, XLI, 44, 1887 and XLVII, 425, 1890). The first set of König curves prove simply that three stimuli *are enough* to reproduce all the colours of the spectrum—they do not show that the actual constituents of normal vision may not be *more* in number. But the extraordinary circumstance that when vision is dichromatic the sets of two constituents (of two very different types) coincide respectively with one or the other pair of the three normal consituents, the blue and the red *or* the blue and the green, is a fact that can only be accounted for by admitting that we have here discovered the actual limited number of constituents of the wilderness of the colour-sensations. (It is this non-occurrence of either the "red" or the "green" *distribution* curve that has made it almost impossible for the physicist to admit the fact that in the case of undeveloped, second-stage vision, it is the more primitive yellow that the defective sees instead of *either* red or green.) In other words, the colour-systems of the two types of chroma-blindness are "reduction systems" (this admirable term is due to v. Kries). Another way of stating the fact here involved is this: in the colour-triangle all points on lines drawn through the vertices R and G will represent colours which look alike to the defective concerned, and their quality will be that of the whitish yellow (or blue) point in which the line cuts the fundamental Y-W-B- line of the triangle. The continued use of the term "confusion colours" shows great ignorance of all these well-established facts of colour-vision. To say that (*Colorimetry Report*, 1920-21, p. 553) "the results cannot be regarded as sufficiently final to justify their adoption in place of a maximally straightforward (!) representation of the facts of colour mixture," and to reproduce König's crude, tentative, curves (*loc. cit.*, page 288), is to have missed this point altogether. The curves may be changed by future more exact methods, but the important thing is that they will both (normal and defective) be changed together, so that the *coincidence* will not be lost.

When it was decided to make the first edition of the *Physiologische Optik* instead of the second the basis of the third edition (1909-1910), the editors automatically left out all of this very important work of König's in the determination of the distribution-curves. Many of the *theoretical* views of König were of such a nature as not to be confirmed by future results—as his belief that the cones have merely a diaoptric function and that the photo-chemical process starts (for the chromata) in the epithelium cells. (It is plain that these large cells would have none of the minute space-specificity which is provided for in the cones.) But that is no reason for not recognizing the fact that his *experimental* work is fundamental in the highest degree. His great paper giving the complete account of this work did not appear until after the death of Helmholtz (1896: reproduced in *Abhandlungen*, pp. 214-321), but his final results had been very fully published, and they were expressly incorporated by Helmholtz himself in the *second* edition.[1] To have published an edition of Helmholtz with all this left out was very much like issuing the play of Shakespeare without the part of Hamlet. I therefore give on the opposite page the original diagram of König (*loc. cit.*, p. 310), never before reproduced as it happens, except schematically (Helmholtz); which exhibits the definitive coincidence between the normal distribution curves (König and Deiterici) and those of two each of the two common types of dichromatic vision (*yellow* and blue, in both cases, as sensations).

THE DEVELOPMENT THEORY OF THE COLOUR SENSATIONS[2]

It can never be known beforehand what ones of a highly complicated (and apparently contradictory) collection of facts will be the ones to throw light upon the whole bewildering subject —to suggest a theory which will reconcile the facts in question and fuse them into one all-embracing conception. In 1891-92, when I had the good fortune to have successive semesters in the laboratories of G. E. Müller and König, and as a consequence to have the Helmholtz and the Hering points of view both very " warm " in my consciousness, I found the antagonistic states of mind produced by these two absolutely incompatible arrays of facts to be very irksome. It was (as I state in my first paper on the subject, *Mind*, N.S. II, 1893) while I was engaged in writing an article to show that a certain theory by Donders was better than that of Helmholtz or of Hering, that it suddenly dawned upon me that a far better theory still was possible. The theory of Donders does nothing towards reconciling the views of Helmholtz and of Hering; but (the converse of the position of v. Kries) it does at least recognize the fact that if vision is tetrachromatic in the retina, it must, to take account of the Helmholtz argument, become in some way " trichromatic " in the cortex. But this

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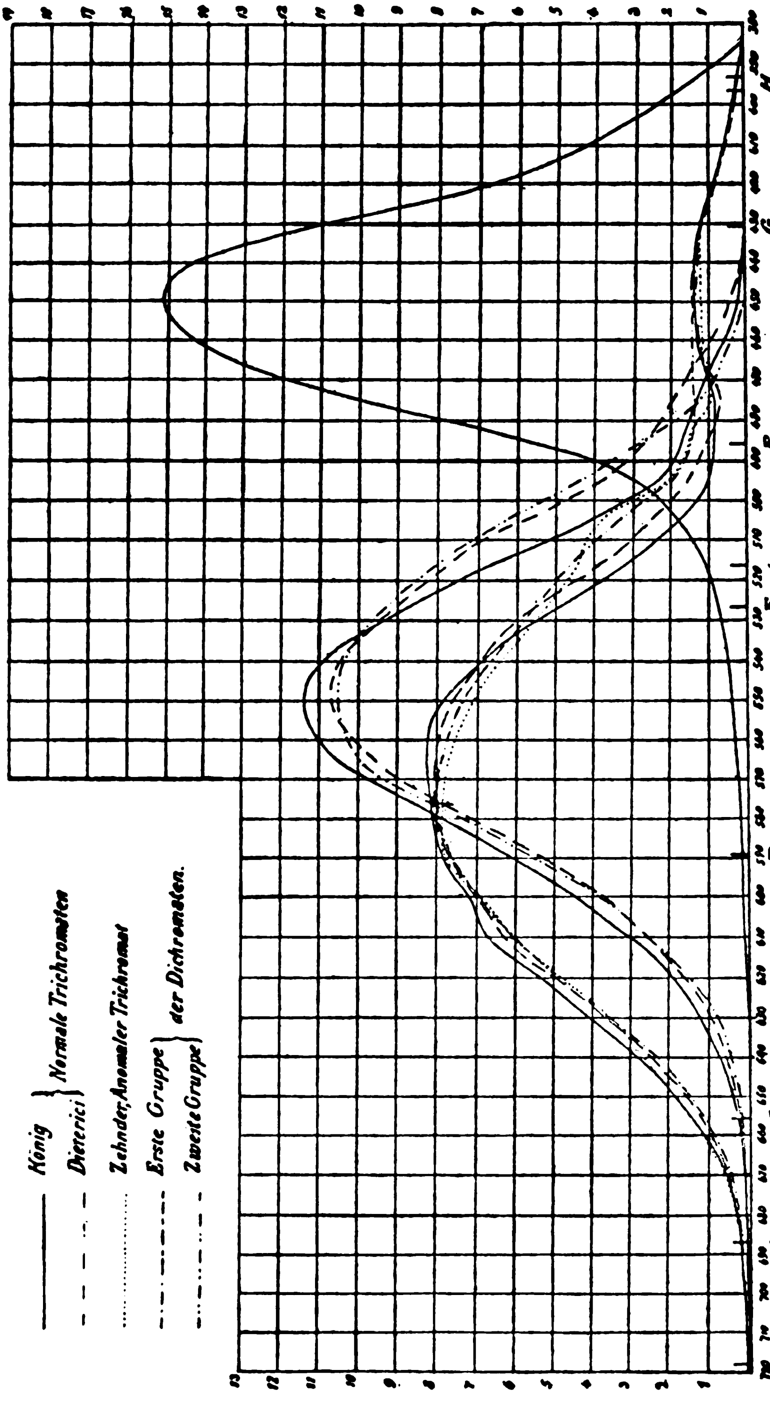
[1] Up to page 640 this edition is the work of Helmholtz solely (as König expressly states in his preface); the account of the work of König is given in pages 357-370.

[2] This has been variously called, by its adherents, the genetic theory, the evolution theory, and the development theory.



The Helmholtz-König Distribution Curves (final, corrected, form) admission does not constitute a *theory* of the fact. All theories of colour (with the exception of the one which I have proposed) fall into one or the other of two classes—they accept (and explain) *either* the facts of Hering *or* the facts of Helmholtz. Thus we have, as theories of "trichromatism"[1] and tetrachromatism, respectively: The Helmholtz School—Lodge, Joly, Barton, etc.; and the Hering School—Donders, G. E. Müller, Fröhlich, Schjelderup etc. Not one of these theorists does more than to shut his eyes to the facts which the rival theories explain. This applies also to the ardent exposition by Fröbes of the theory of Müller, although he comes nearer than is customary to understanding the adverse facts.

But in the light of the order of development of the colour-sense, the question becomes less insoluble. The remarkable fact of *the double structure and the double function* of the retina (rods and cones—Max Schültze, Parinaud) was already sufficiently well established to be made the foundation stone of a new theory of colour. And not only was it known that rod-vision is white vision, and that chromatic vision is cone-vision; it was also plain that the chroma-pairs did not occur both at the same time, that the yellow-blue pair preceded the red-green pair. With this it became possible, by what Hegel might have called a "higher synthesis," to reconcile the Young-Helmholtz tri-receptor process in a cone with tetrachromatism for sensation (Leonardo da Vinci, Brücke, Aubert, Hering), and to explain at the same time those singular phenomena, the reversion of the red-greens to yellow and the yellow-blues to white.

The theory thus indicated may be described in the following terms. It is assumed that there is a light-sensitive substance in the rods which gives off, under the influence of light, a reaction-product which is the basis of the primitive sensation of whiteness. In the cones, in the next higher stage of development of the colour-sense (the yellow and blue vision of the bees, and of our own mid-periphery), this same light-sensitive substance has become, by a simple molecular re-arrangement, *more specific* in its response to light, and in such a way that the two ends of the spectrum act separately to produce nerve-excitant substances which, however, when they are produced both at once, unite chemically to form the "white" nerve-excitant out of which they were developed. In the third and final stage the "yellow" nerve-excitant has again undergone a development in the direction of greater specificity, and red and green vision are acquired. These reaction-products are, however, the constituents of the more primitive "yellow" nerve-excitant, and hence when they both occur at once—when red and green light fall together on the retina—they revert to the "yellow" nerve-excitant. If blue light is now added, the white sensation is again produced. Thus "yellow" and "white" are, in tetrachromatic vision, secondary products; at the same time *they are the identical nerve-excitants* which produced the more primitive forms of vision. In other words, (1) a light-sensitive "mother substance" in the rods which, on dissociation by light, gives off a cleavage-product, W, resulting (in the cortex) in the dull white sensations, becomes (2) capable of giving off two subsidiary cleavage-products, Y and B; Y is split off by light of low frequency and B by light of high frequency; Y is the nerve-excitant for the sensation of yellow, B for the sensation of blue. But suppose that, chemically $Y+B=W$; then if Y and B are both split off at the same time in the same cone they (being by hypothesis the chemical constituents of W) immediately iunite to form W, and the *sensation* produced will be the primitive white. So, in the third stage we shall have, in brief:

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[1] This word is a misnomer, if we take *chroma* in its actual significance. The vision of the totally chroma-blind is not monochromatic but achromatic. The initial three-fold photo-chemical process which actually takes place in a cone should be called a *tri-receptor* process.

$$R+G=Y, \qquad Y+B\,(=R+G+B)=W.$$

The accessory phenomena of colour are also given a perfectly simple and satisfactory explanation in this theory.

It is not necessary to discuss here the theory of Professor Hering; in addition to all its other difficulties it is absolutely incompatible with the Helmholtz fact of the tri-receptor process and consequently it has, naturally, never appealed to the physicists. There is no occasion for considering (as does Parsons) at great length all the minor merits and demerits of the Helmholtz and Hering theories. The situation is simply that Hering confutes Helmholtz and Helmholtz confutes Hering.

Before the time of Lavoisier, when chemistry was not yet in existence, the alchemists might by chance have discovered that on putting hydrogen and chlorine together in a test-tube, under certain conditions both of these substances disappear and hydrochloric acid takes their place. Being not yet chemists, they might have explained this experiment in this way: they might have said: "Hydrogen and chlorine are a naturally antagonistic pair of elements—when they are put together in a test-tube they both vanish and a hydrochloric acid which was there all the time takes their place." This would be analogous to the Hering explanation of the fundamental event in colour. But since chemistry *does* now exist, it would be a pity not to take advantage of its effectiveness for explaining disappearances and appearances.

The assumptions which I make (representing the psychological actualities) have been confirmed in a remarkable manner. (1) That the cones are *anatomically* more highly developed rods has now been put beyond question by Ramon y Cajal. It is natural therefore to think that the light-sensitive substance which they contain has undergone development, and that too in the direction of greater specificity. (2) But following upon the discovery of Weigert (the photochlorides) that a specific light-sensitive substance need not show colour to the human eye, Hecht has proved that that in the cones actually *is the same substance* as that in the rods, save that it has undergone a " molecular rearrangement "—the very phrase that I am in the habit of using to characterize the change in the colour-molecule made necessary by the *psychological* considerations (the same final whiteness-sensation in the cones as in the rods, though due to a three-part mechanism). (3) Moreover nothing could be simpler, chemically, than this situation. In fact (as Dr. Acree has pointed out to me) there is a perfect analogy for it in a certan dye-stuff, a rosaniline carboxylate (no longer in practical use because it has been superseded by other less labile dyes). This is a substance such that (under proper conditions of light, heat and moisture), (*a*) hydrogen, chlorine and ethyl alchohol can either one of them be given off separately; but (*b*) when hydrogen and chlorine are given off together, they unite to form hydrochloric acid (analogue of the yellows); (*c*) when ethyl alcohol and *either* hydrogen or chlorine are given off, they do not unite—they persist as mixtures (analogue of the blue-greens and the blue-reds); (*d*) when all three of these substances are given off at once they unite to form ethyl chloride (analogue of the three-part leucognic nerve-excitant in the cones). In other words, the ethyl alcohol set free does not unite with either the hydrogen or the chlorine until after they have first united with each other, exactly as a " blue " constituent in the retina does not chemically unite with either a " red " or a " green " constituent *unless* they have first united with each other to make yellow. Nothing could be more perfectly analogous to what is required for the phenomena of colour-vision.

In conclusion it must be kept in mind that no theory of colour-sensation is deserving of consideration which is not built upon, at once, (1) the fact discovered by Thomas Young (and magnificently confirmed in the laboratory of Helmholtz)—that three light-stimuli are sufficient, as a physical cause, to start up the retinal photo-chemical processes: (2) the apparently contradictory fact that nevertheless the *sensations* are *five* in number—yellow and white have been somehow added; (3) the very illuminating fact that the *order of development* of the colour sense can be made to account fully for this anomaly and also for (4) the disappearance of the red-greens (and of the yellow-blues) and the appearance in their stead of yellow (and of white). Any proposed theory should be subjected to the test: does it meet all of these " minimal requirements "? (See *Journ. Opt. Soc. Amer.*, etc., 7 pp. 66-68.)

A fuller account of the Development Theory of Colour Sensation will be found in: *Zft. f. Psychologie*, 4, 1892; *Dictionary of Philosophy and Psychology*; *American Cyclopedia of Ophthalmology*, 1913; the *Psychological Review*, XXIII, 1916 and XXIX, 1922; *Mind*, 1892, 1893; and *Science*, XXII, pp. 18, 19. In the last two places I haae discussed its fundamental difference from the theory of Donders. My theory has been taken over by Schenck without due acknowledgment, as has been pointed out for me by v. Brücke (*Zentralbl. f. Physiologie*, 1905). Schenck, however, failed completely to see all that my theory accounts for: he felt, himself, no necessity for explaining (he was not a psychologist) what I explain very simply in the light of development: namely, the reversion of what we should see as the red-greens and the yellow-blues to the primitive sensations, yellow and white.

CAN INSECTS SEE COLOURS?

By H. MUNRO FOX

Professor of Zoology at the University of Birmingham.

Whether insects can see colours or not may seem at first an abstruse question, of interest only to the specialist. But is this really so? A moment's reflection shows that to all nature lovers it is of paramount importance to know the answer. For why are flowers coloured? The naturalists' answer is that flowers are coloured in order to attract insects to them. The reason why it is essential to flowers to receive the visits of insects is, of course, that pollen must be carried from one flower to another. Darwin first showed that when a flower is fertilized with pollen produced by itself, the resulting offspring are weaklings. But when the pollen has been carried to the flower from another plant, the offspring are vigorous. It is the insects that do this useful work, receiving in return the nectar which the flowers prepare for them and which is their food.

Since Darwin's day it has been assumed that flying insects see the flowers by their colours and thus know which of them to visit. This satisfying assumption received a rude shock a few years ago from a German biologist named von Hess, who had studied the behaviour of all kinds of lower animals, insects and others, and came to the conclusion that all of them alike are quite incapable of seeing colours. For all lower creatures the world must thus be gray. What we call colours they would see only as different monotonous shades of gray, This came of course as a bombshell to orthodox naturalists, for what then could be the *raison d'être* of flower colours? It would really be too self-centred to suppose that the gorgeous colours of flowers exist solely for the esthetic pleasure of man. Yet apparently he alone could appreciate these colours. Or are the colours pure accidents? Are flowers purple or rose or blue just as an emerald is green or blood is red.

Again, many animals are apparently camouflaged, having the same colour as their surroundings and so apparently being less visible to their enemies. Some, as grasshoppers, are permanently of the same tint as the world around them, others can alter their colours to suit a changing milieu. The chameleon notoriously changes its colour, and many fishes, shrimps, and other creatures vary their coats to match the ground on which they are lying. But of what use would all this colour camouflage be if enemies had no appreciation at all of colours?

Let us look more closely into the studies of von Hess. How did he arrive at this startling conclusion that the lower creatures are colour-blind? To start with, we know that there are several sorts of colour-blind men. The most frequent variety of the disease is a condition in which persons can only see two colours, yellow and blue. What normal men call red, orange, yellow, and green such persons call yellow in different shades. Blue-violet and purple they see as blue. Besides this fact that only two colours are appreciated, there is another essential difference between the vision of these colour-blind people and that of normal individuals. When they look at the rainbow or spectrum, all normal people see yellow as the brightest of the colours. But colour-blind people see what we call yellowish green,—but what they call a shade of yellow,—as the brightest hue. In a rarer condition of colour-blindness no colours at all are recognized. Such a completely colour-blind person sees all the colours merely as different tints of gray, some brighter, some duller. When shown the series of different colours on the spectrum, such people again choose what we call the yellowish green as the brightest region of their grays.

Now it is just on this distinction between the brightest region of the spectrum as appreciated by normal and by colour-blind persons that von Hess's conclusions are based.

Many animals move toward light. This is a very well-known fact. Not only the moth flies into the flame, but numerous other lower creatures such as insects, water-fleas, worms, snails, slugs, or even fishes, fly, creep, or swim toward a light. Now von Hess's method of testing the colour vision of these animals was this. A dark room or aquarium containing a number of the creatures to be tested was lighted from one side. A simple lamp was not employed, but an arrangement which gave all the different spectral or rainbow colours. They chose out one particular colour and went toward it. The chosen tint was in all cases the yellowish green. Now it is just this same tint that colour-blind people see as the brightest hue of yellow,—or of gray,—that they can appreciate. People with normal colour vision, however, see the pure yellow, not the yellowish green, as the brightest colour. Therefore, von Hess concluded, the fishes, insects, and all the animals lower still on the scale of existence, are colour-blind, for they appreciate brightness just as colour-blind men do.

But does this conclusion really follow? Do the experiments mean any more than that the brightness value for the various colours is different for the lower animals from what it is for normal man? Must we conclude that insects see no colours at all in flowers? Von Hess's conclusions have raised in the last few years a storm of protest from biologists. It has been pointed out that his experiments, interesting as they are, do not warrant such wide deductions.

Verbal criticisms of von Hess's opinions, however, are insufficient. Fortunately, experimental criticism is forthcoming. Most of this experimental work has either been done or has been inspired by another German biologist, Professor von Frisch. He has for a number of years carried out a long and thorough investigation into the colour senses of fishes and insects. The methods of von Frisch are adapted to give more direct information concerning the question at issue. It is obvious, of course, that very considerable ingenuity is necessary in devising the experiments, for an insect cannot be asked point blank whether he appreciates a red or a purple flower. Indeed, neither can a partially colour-blind human being,—one who cannot distinguish red, yellow, and green from one another,—be asked such a question directly. For such a person gives the names red, orange, green to the various shades of yellow that these colours appear to him. His colour-blindness becomes apparent only when he is asked to match various colour patterns with one another. All candidates for jobs as railroad signalmen are thus tested, for it is naturally all-important for them to be able to distinguish colours. Now it is just such a method that von Frisch has employed in testing whether bees and other insects can see colours or not. The bees are asked to distinguish various tints from one another.

How the questions are put to the bees and how the insects can answer them will be told presently. But first let us look shortly at von Frisch's experiments showing that fishes are after all not totally colour-blind. Certain fishes, such as plaice and soles, can change their hue to suit that of their surroundings. In this manner they become less visible to us and presumably also less visible to their enemies,—provided always that these enemies can appreciate colours. The colour change in the skin of the fish is controlled through nerves, and these nerves are actuated by impressions received through the eyes. Blind fishes cannot change their skin colours to match the bottom upon which they are lying as normal fish can do.

If two plaice, tinted alike, are put one upon a light gray ground, the other upon a dark gray ground, in a few seconds the first assumes a light gray coat, the second a dark gray shade. Again, if two fishes are placed one on a yellow ground, the other on a gray ground, the first turns yellow, the second gray. Now the all-important question that arises from this is: Does the fish which turns yellow appreciate the yellow colour or does it merely see yellow as one of the shades of gray? That the first alternative is the correct one follows from the fact that it is impossible to induce the fish to turn yellow by placing it upon any shade of gray whatever. When it was on a yellow ground therefore the fish must have appreciated yellow as being different from any depth of gray. The outside world is thus not merely a drab gray to the fish.

From the point of view of the meaning in nature of the colours of flowers, however, it is of paramount importance to test von Hess's conclusion that insects are totally colour-blind. Von Frisch studied bees. He gave the insects a complete series of colours to choose from and watched first whether the bees made any mistakes in their choice of colours.

How could bees be persuaded to choose colours? Difficult though this proposition appears at first sight, it is really comparatively easy. A series of differently coloured pieces of paper are placed in a row. Food for the bees is placed upon one of the colours. The bees naturally make for the food, which they smell. After this has been repeated a few times, the pieces of paper are again prepared for the bees but the food is omitted. The bees still make a bee-line for that colour upon which the food previously had been placed. In this way insects can be trained to fly to any desired colour.

Apparently, then, the bees appreciate the colour differences between the pieces of paper. But it might still be that the different colours impressed the bees merely as shades of gray. That this is not the case and that the bees really do see the colour tints is proved by the fact that the colour to which the bees have been trained to fly cannot be replaced by any tint of gray whatsoever. Once trained to fly to a certain colour they make no mistake afterwards. They never in error fly to a wrong colour.

Nor is this all. Recent research has shown that some insects at least can see colours of which we have no inkling. They appreciate colours which we cannot by any stretch of the imagination picture to ourselves. It is common knowledge that white light consists of a mixture of lights of various colours and that each coloured light consists of a wave motion having its own special wave length. Red has a longer, green an intermediate, violet a shorter wave length. There exists, however, a very large number of other radiations, some with a wave length longer even than red light, others with a wave length shorter than violet light. There is no essential difference between these infra-red and ultra-violet radiations, as they are called, and coloured light. All consist alike of wave motions, the differences being merely in the wave length. Some of the longest wave-length vibrations are utilized in wireless telegraphy. Some of the shortest wave-lengths constitute the X-rays which can pass through substances like human flesh that stop or reflect visible light waves. The visible waves then, are a very small proportion of all the radiation waves that exist. Yet these relatively few visible waves are the only ones which our eyes can appreciate. The colours which we know, gorgeous as they are, are merely a very small fraction of all the colours which really exist in nature. We just cannot see the other colours,—nor imagine them,—owing to the imperfect structure of our eyes. Were our eyes built differently, what appears to us as colourless would be coloured with some unconceived tint.

This being so, one naturally asks oneself whether perhaps some creatures cannot see colours unimagined by us, colours beyond the red or beyond the violet. And strange though it may seem, this is actually the case. Certain insects can see ultra-violet light, which is colourless to our eyes, though indeed it affects our bodies in various ways. The healing influence of Alpine sunlight and of the Finsen lamp are due to the large proportion of ultra-violet rays which they contain. Freckles are the work of the ultra-violet light of the sun. Beauty specialists now use ultra-violet radiation to induce a pleasing tanned complexion. But although these rays thus influence our skin, and may even injure our eyes, we can neither see nor imagine a colour for them. But bees appreciate ultra-violet light in the same way as they do the light which is coloured to us; for they can be trained to come to such rays in the same way as they can be trained to come to the colours which we can see.

Some flowers will have ultra-violet tints, others will not. Of two flowers appearing equally red to us, the one may have no ultra-violet but the other have ultra-violet in addition to the red, modifying and changing the tint of the latter. This may explain why an insect chooses one only out of two flowers which to us appear to have identical colours. Much more experimental work is required to decide these burning questions.

It is plain, however, that it is we who are more colour-blind, not less colour-blind than the bee.

ARE WE BECOMING MORE CONSCIOUS?

BY I. A. RICHARDS

Fellow of Magdalene College, Cambridge

I have hung a large mirror in my open window,[1] so that I can now see from my chair twice as much of the world outside. Past its rim my glance travels down across a tableland of black irregular roofs where queer tanks crouch on tripods and look like insect monsters. Clouds trail their shadows across this plateau which is riven not far away by a canyon at the foot of whose window-roughened walls flows a ceaseless traffic. This vista is closed by a gleam of water. Within the mirror the same tableland expands, then mounts, then is broken by the swift towering uprush of peaks whose form I have seen elsewhere only in the Dolomites. From their shoulders and crests white plumes of steam float and wave in the sunlight. I gaze at them, trying to decide whether it is their outline, or the knowledge I have that they are not natural objects but habitations of man—in fact, a typical New York roofscape—that makes them loom with such a veiled significance. What happens when men take to building mountains for themselves to live in?

All the things which I can see in the looking-glass have a queer extra vividness, depth, and grandeur which make the things seen directly appear trivial and almost unreal. Their colour seems poorer, their contour flatter, their movement less spirited. They have a meager, desiccated, faded air, as though the life had been drained from them, but the mirror world beside them blooms with a mysterious and occult vitality.

Anyone may verify this mirror-effect; any mirror will give it, though the clearer the mirror the more striking the change. It is best seen when distant objects—mountains, clouds, or remote horizons—are within the reflected field of view. Many people, before and since Lewis Carroll, have brooded upon it without much result, for it is one of those facts of consciousness for which no full explanation has yet been found. Some would attempt to trace it to the " frame effect." By putting a frame round any view we increase its interest—that is why scenery is more impressive when viewed through the windows of the train or from a closed car than when we are in the open with it. But here the direct view through the window is more solidly framed than the mirror view, which seems to demolish this explanation. Others endeavour to link it up with the fact that the landscape looks more spacious if we contemplate it with our heads upside down. But this last effect has a basis in the structure of the eye and in the " routine of sensation " which is lacking here. The two cases are not parallel. We shall have to dig deeper into the facts of consciousness if we are to reach even a conjectural account.

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[1] This article was written by Mr. Richards on the occasion of a visit to America in the summer of 1926, *en route* for China. It is copyright in America by *Harper's Magazine.*

These same excavations have a bearing upon our whole contemporary existence as conscious beings, upon the quality of our daily, hourly sentience, and upon the trend of civilization. For we must estimate this trend in terms of our consciousness, by the changes which are taking place not only in our intellectual outlook or in our emotional reactions but in the very air and semblance which the world from moment to moment wears. If the mind changes, everything alters with it.

There is some reason to think that our minds are changing. They must have altered often in the past, and human circumstances have never been so rapidly transformed before. We change our minds in a sense, of course, every day and every year ; but I am not thinking of such changes as spring from hopes or fears, luck or failure, fashion, education, or new opinions, wars, strikes, or prosperity. These and a thousand other things vary the texture of our lives for us by weaving in this or that coloured thread in new proportions and new patterns. I am thinking instead of changes in the colours of the threads themselves, changes at the dye-works, as it were, the dye-works being whatever it is which settles whether and in what degree and with what nuance we shall be conscious, which settles in short the quality and range of our feelings.

The Universe, as we know it at present, contains nothing so puzzling as Consciousness. And the oddest thing about Consciousness is that we should know so little about it. We have lately found out far more about the physical world than we could reasonably have expected ever to discover. But the nearer we come to ourselves the less hopeful investigation seems to be. We know more about the Giant Stars than about the Sun ; we know more about beer than about our blood ; and we know far more about our bodies than about our minds, if indeed these are not, as seems likely, two names for the same thing.[1] But let us at least use whatever hints there are.

Not all the many happenings in the mind are conscious. We can get some light upon the mystery by comparing those that are conscious with those that are not. Consider first: there is the wide contrast between the mental inflow and the mental outflow. Broadly speaking, the outward flowing tide of our impulses is not conscious; but a good deal of the inward flowing tide is. At the gates of our senses a myriad applicants are always battering. Comparatively few get through: those only which can engage such of our interests as are awake or can awaken a sleeping interest. It is the privilege of pains that they can nearly always waken some interest. Pains find these gateways easy to pass and normally they override all opposition. Even the strongest preoccupation goes down before them, and pains are—and this is a significant fact—the most intense form of consciousness which normal people know.

All other appeals to our attention have to adjust their claims to the simultaneous claims of numberless other appeals. Sometimes the adjustment is impossible. The pathway by which the appeal must be forwarded is already occupied, the line is busy. In these cases we ordinarily do not notice that any appeal has been made. We have been too much occupied to attend. But we may discover afterwards that we really *did* see or hear whatever it was that we passed by unnoticed. Those curious cases in which people dream of the whereabouts of lost objects illustrate clearly this curious fact of seeing without conscious awareness.

At the other extreme, acts which have become habitual, such as walking or writing, go through at the prompting of appeals from the sense-organs which are too smoothly adjusted to the claims of our other activities for consciousness to arise. The gradual lapse from consciousness of these activities as they become automatic suggests that consciousness may be compared to friction or to resistance. The best rough simile for describing consciousness is perhaps the electric light. If the current passed more easily through the filament no light would be given out. But the resistance in the case of consciousness is a complicated matter and seems to depend upon the difficulty of combining the activities which our sensations and ideas call for with the other activities which other sensations and ideas are already investigating. Consciousness, in other words, arises through the mutual give and take by which the demands made upon us decide what our action shall be. The sight of a fly washing its face is in this sense a demand for action, if only for the action of watching it instead of getting on with the job. Most people will have noticed what an added vividness and intensity such trivial spectacles often gain through the fact of conflicting with or being integrated with more important experiences. At the moment of the greatest moral crisis of his life Stavrogin became absorbed by the sight of a small green spider which seemed to him more vivid, more remarkable, and more "real" than anything he had ever seen; and Dostoevski, who was far more conscious than most people and a very penetrating observer, put a great deal of his own experience into Stavrogin. Most people can parallel this observation from their own lives.

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[1] I am indebted here and at some other points to *The Meaning of Psychology* by my friend and collaborator Mr. C. K. Ogden.

This same formula—that consciousness is an affair of integration under difficulties, covers also the emotional side of our existence. We become violently moved only when there is some conflict of tendencies within us. Think of the agitation in the timid lover's breast, so much less intense when the timidity has vanished. When there is no conflict we act immediately and almost unwittingly; and this holds good also of our most delicate and subtle emotional experience. The evidence on this point from the analysis of works of art, which after all do provide the best instances for studying this branch of psychology, is very strong. Literature and art have been too much neglected by the psychologists. They do perpetuate, in the only way in which perpetuation is possible, the very states of mind which he is concerned to examine. And they provide a clue to the direction in which consciousness may be changing which we cannot find elsewhere.

We can now come back, *via* my mirror to our main question. The secret probably of the heightened vividness of the mirror view is that it shares something of the picture's appeal. If we did not know that it is a mirror-space, not an actual space, into which we were looking, would this effect of extra depth and significance be found? The direct experiment is practically impossible for obvious reasons. The few glimpses which I have had into mirrors which I did not know to be mirrors have been inconclusive; but in each case, so far as I can recall, I discovered them to be mirrors not by noticing that what I saw was too good to be true but by detecting the surface gleam or by discerning some familiar object, such as myself, in the field of view.

Since experiment fails we are driven back upon the general argument. Vision through a looking-glass involves one thing more than ordinary direct vision, one additional factor to be reconciled with the appeals made by what we see—the knowledge, namely, that we are looking into a mirror. This knowledge, I suggest, offers just that additional friction or resistance which makes the scenes we view appear to be dowered with extra vitality. And this remark about extra vitality is only another way of saying that our consciousness, that part of it which is concerned with what we see, is increased through this slight resistance. The same explanation applies, though less simply, to pictures; the opinion that the less we realize that it is a picture—not a man, some dustbins, or a tree—which we are looking at, the better must the picture be, is an intellectual fallacy most favoured by those who have least interest in pictures. The facts are the other way about.

It is the way in which we have to combine the effects of the picture as a surface with the effects of the picture-space, the imaginary three-dimensional world we see within it, which gives the painter his opportunity to make us more conscious while we are looking into his picture-space than we normally are when looking at actual things. A similar combining activity partly explains our increased consciousness of what is said when this is given the artificial rhythm of verse, or the extra " reality " of the stage Hamlet which comes from our knowledge that he is only an actor.

Taking then this general notion as a guide, that the acuteness and vividness of consciousness depend, among other things, upon the friction or mutual resistance of diverse combining impulses, what changes should we expect to be taking place in contemporary consciousness and what actual instances of such changes can we find?

II

The general impression which perhaps most often comes to the surface in a foreign mind, attempting for the first time to respond to the bewildering and intoxicating phantasmagoria of New York, is that here is the clue, the half-worked-out solution, to problems which he has hardly been able even to formulate on the other side of the Atlantic. Specifically, problems concerning the future. He will know before he comes that something very strange has befallen Western Civilization. He will be familiar with plenty of those cracks which indicate that a break with the past on a most enormous scale is taking place. He will have wondered, not perhaps without some degree of dread, what terrific new scene in the drama of humanity is about to be staged. The War will have prepared him for anything, if he is old enough to remember it, and the rapidity with which it is being forgotten and the completeness with which the younger generation now ignore it are among the disturbing symptoms above mentioned. He will have tried to define for his own satisfaction the general trend of the changes which seem to him most suggestive and to prepare an attitude and a set of feelings with which to greet them, only to be discouraged by his own obscurity. Then he comes to New York, to find himself within a few hours apparently right in the middle of the very state of affairs which he had been trying vainly to imagine.

Above him soar buildings which have no counterpart in human history; about him throng leisurely unworried people, varied enough to give an ethnologist a nightmare, dressed and groomed in their tens of thousands with a care and refinement only to be matched in small, very select European circles. Through them passes an armoured car to halt at the door of a bank, but nobody seems surprised. On every hand immense hotels offer the hospitality of their luxurious lounges to all and sundry who seem to use them as public places, dropping in to listen to the band or to chat beneath a waving palm—kept in motion by a well-placed fan. In the Public Library, even on a fine Saturday afternoon, hundreds of youthful readers sit working with all the air of serious students. And at night when the streets take on a new beauty from the coloured fairy-lights borne by the myriad rushing cars, nobody seems to go to bed or even to look tired. Innumerable eating places are open and crowded till the morning.

I despair of being able to indicate to an American how all this impresses the English visitor. After two a.m. in London the people to be seen eating in public are racing touts or similar flashy individuals, on whose faces is the stamp of weariness or dissipation. On the other hand, our bank messengers, as far as I remember, wear top hats to distinguish their calling—but for the rest are unprotected.

That armoured car is the fly in the ointment and the point from which the visitor's speculations set out. He soon learns facts, familiar enough to every American, which account for it. I have generalized some of his reflections—about the new consciousness which springs from new blends of impulses—taking my mirror for a parable. Let me particularize them here. All through contemporary Western civilization a change is occurring, slowly in Europe, more rapidly in America, which may be described as the substitution of suggestion for tradition. Tradition, what some would call the instinct for law and order, never more clearly shown than in the General Strike, protects the bank messenger in England. The bandit has no hope of escaping, for public opinion is too solidly and effectively against him. Over here, suggestion, if it does not indeed help the bandit in some respects, has not yet stepped in to take the place of tradition. But tradition is also breaking down in England, as it must in all communities much exposed to diverse influences. When the living, as opposed to the imitation, art of a people becomes untraditional it is only a matter of time for the rest to follow suit.

The living art of America, its vaudeville, its skyscrapers, and its poetry, reveal, as we should expect, a still bigger break with tradition. And suggestion, a fact which many Americans seem to deplore, is much stronger. Witness the power of advertisement and publicity in America—the really secluded English rural community gives a very poor response to a poster; witness the suddenness and brevity of popular crazes; witness the immense and ephemeral reputations of the most varied writers—reputations which sometimes seem to have so little basis. An astonishing plasticity or adaptability, and an equal suggestibility are the two impressions of American mentality which a visitor receives—after the first effect of a masked heterogeneity has worked off. It is possible that this very susceptibility to suggestion, explained in part by the mingling of traditions which is here going on, is the greatest asset of the American and the one which holds out most hope for the future of mankind. For only such a suggestibility will allow for an increased fluidity to be held in control. Man has hitherto been too little plastic, too little able to meet new situations with a new and appropriate response, too bound down by his habits. I have known a very distinguished neurologist deplore the low percentage of our asylum cases as indicating too little power of variation. But too much adaptability is dangerous to society as well as to the individual. It is a most hopeful sign that the publicity expert has such power over here, for some powerful influence is required to keep fluid people together.

I have not really departed in all this one jot from my title, for the use of suggestion (in this wide sense) in place of tradition is virtually a making conscious of what was formerly unconscious. The traditional Englishman, now fast disappearing from the plowlands, had so many expectations so fast rooted in his mind, so many habitual responses to settled routines of experience, that he neither knew what they were nor, when they were by chance frustrated, knew what had happened. The Derbyshire man who grew "dizzy-like" if he were taken more than a mile from his home illustrates my point perfectly. By comparison the American has few settled expectations, but those he has he knows about, and he is markedly anxious to know more. It is no accident that Psychology is "that American subject" as they call it at Oxford. From the sophomore's preoccupation with the "poise" which his University career ought to give him to the desperate struggle of the modernist poet to render in full explicitness every apparently trivial detail and nuance of sensation and feeling, this transfiguration of the unconscious into consciousness is to the English visitor the dominant American characteristic, the feature which most links America with the future.

It is this feature also which most misleads the European who is constantly embarrassed by the American's zeal for elementary discussions. It takes some time to realize that this baffling enthusiasm over truisms—over the fact that poetry is so beautiful, human nature so strange, or pleasure so attractive—does not necessarily mean either defective education or vacuousness or infantility. It is due to the simple fact that what is obvious and inevitable, accepted and settled for the European—taken for granted, almost unheard of and forgotten—is often none of these things for the American. " What is concluded that we should conclude anything about it ? " asked Benjamin Paul Blood. A great many things are both concluded and concluded about in the European mind which are as fresh and beguiling as spring in the American mind. The moral issues for example. Why do this or not do that, and why do anything ? To say that something is " not done " has a different meaning for the Englishman and for the American ; so different that neither can quite understand the other. To put the difference metaphorically, the veto comes from much deeper down in the English mind. The American nearly always knows why it is not done, the Englishman hardly ever. All of which makes the American seem as shallow, rootless, light, and transparent as the Englishman seems dense, secretive, stagnant, and instinctive.

Both impressions are, of course, mistaken. For the American's truism which bores the Englishman is not what the Englishman thinks it is, and the Englishman who seems so oddly uninterested and uninteresting may be responding in ways which the American knows nothing about.

Both English and Americans would be startled if the partial breakdown of communication were suddenly set right. The whole mental routine of the American has altered, the interplay of his impulses has shifted so that they have to be adjusted to one another much more consciously, much nearer the surface. In comparison with the European he *improvises* his life, and in the fact that he can do this so successfully lies the great promise of American civilization.

That there is another side to the matter, I know well. This deliquescence of what have so long been the rock-firm foundations of culture, our unquestioned, unconscious assumptions by which life is ruled and its goal set, is more a threat than a promise, unless conscious reflection and observation can provide better foundations. And the transition must inevitably involve casualties—minds which are merely chaotic, or lopsided, minds which have failed and have returned to cling desperately to some incomplete and imperfectly realized tradition. For a true tradition is something which we hardly know we possess. The little talked about but universal custom of having ice-water on the breakfast table is much more a true tradition than, for example, "Mother's Day." As soon as we become conscious of it, the tradition has been pushed out of its proper place and become a superficial not a deep lying part of the structure of our minds. No genuine tradition was ever built up deliberately. The highly conscious status of most American traditions is only another example of the changes which I have been discussing.

Meanwhile this emergence into consciousness of problems and decisions which were once handled automatically brings with it, I believe, a general heightening of consciousness as well as an extension, a recolouration of the whole content of the mind analogous to that extra-vividness of the mirror view from which we set out. Together with this goes an eager interest in life and a passionate, if bewildered, desire to do something with it, "to have a good time," which makes the visitor feel sluggish. Often this interest seems to concern itself unduly with trivialities, with the accidents not the essentials of existence. And if this were so it would not be surprising. But sometimes this appearance has a better explanation. Thomas Gray was content to mention "the lowing herd," and could leave the rest securely to his readers' imaginations. A modern American poet has to describe the beasts as though nothing resembling them had ever been seen before. One reason is that he cannot count on his reader to the same degree; another is that his own impulses toward a cow are much more mixed and, therefore, he is himself much more interested in how exactly she seems to him. He may not do what he sets out to do as well as Gray, but we should be clear that he set out to do something different, and why he cannot as a serious artist set out to do the same old thing. And the poet is only the extreme instance (though his compatriots may not always recognize him in his lifetime as such) of what is happening in some degree to every mind in the community. New conditions, the break-up of immemorial conventions, the mingling of influences, and the task of integrating impulses which have never before come together, have involved America *en masse* in an experiment which only a few individuals have hitherto attempted, the conquest through consciousness of a new kind of control over the future of mankind.

THE ORIGIN OF LANGUAGE

By SIR RICHARD PAGET

There is probably no single accomplishment in which man excels the rest of the animal kingdom more than in that of "putting it across", that is, in communicating his thoughts by speech and writing. All the higher animals have, no doubt, the power of making themselves understood, more or less, by their fellows. They make great use of emotional cries,—for example, of warning, challenge, fear, joy, anger, pain, or love. They also use bodily gestures for the same purpose,—as when a dog wags his tail or shows his teeth or licks his master's hand. The higher animals also explain themselves by gestures,—as when a dog pulls at his mistress's skirt to "ask" her to take him out for a walk, or goes to call for help in the case of an accident to his master and personally leads the rescue party to the spot.

It is clear, however, that the "language" of the animals is a very imperfect instrument of communication, and that only the most rough and ready messages can be "put across" by such sounds or gestures as animals use among themselves. Further than this, the animals have (so far as I know) no method of recording their ideas. It follows from this that the knowledge and experience acquired by the individual animal can not be made available to his fellows or successors.

The nearest approach, in my recollection, to a method of recording ideas is the device in use among the bees for indicating the presence of good honey (nectar) or good pollen. According to the observations of a German scientist published about two years ago, the bee who found good honey deposited near the spot a drop of scent to advertise the find and returned to the hive, where she performed a ceremonial "honey" dance. Whereupon, all the other workers who required honey went out and searched for the scent mark. If, on the other hand, the original worker bee found good pollen, she scented the spot as before, but, on returning to the hive, performed a different kind of dance which signified finding pollen. Here then, is a combination of a gesture or sign language with a method of recording by marking the site of the objects referred to by the signs.

According to Professor H. F. Osborn of the American Museum of Natural History,—and there is no better living authority,—man has led a separate existence on this planet for something like two million years. The beginnings of his invention of the art of speech are, therefore, almost unimaginably remote. Yet it is possible, by the study of speech, even as we have it to-day, to form some idea of how it began. By experiment as to the actual nature of the various speech sounds and by comparing the sounds with the " posture " or " gestures " of the tongue, lips, and other vocal organs, a rather surprising conclusion is reached.

It appears that in listening to human speech we are not really interested in the *sounds* of the speaker's voice. What we are actually listening for are indications of the movements,—postures or gestures,—the speaker is making with his organs of articulation, that is to say, his lips, tongue, soft palate (which opens and closes the passage to his nose), and the other movable parts of his throat. In other words it appears that when we talk, we are symbolizing our thoughts (or such of them as we intend for publication) by making a kind of sign language, and that when we listen to another person talking we are reading his sign language " by ear ". Our method of understanding speech is, therefore, exactly the same as that of a deaf person who has been taught "lip-reading", only he lip-reads by eye, while we do the same thing by an unconscious process of decoding the sounds of speech back into the sign language of tongue and lips which produced them.

The method by which the sign language of articulation was originally developed can, of course, only be guessed at,—and by a big guess at that, seeing that we have to guess across a million years or two. But the case is not hopeless. Let us imagine that man, in his most primitive state of civilization, behaved not unlike the higher animals now, and that he expressed his emotions by emotional cries and explained himself by gestures of his face and limbs generally. As he became more and more engrossed in the arts and crafts,—chipping flints for knives, axes, and arrows; pursuing the chase; making bone needles; piercing shells for the use and ornament of his lady friends, and so on, —his hands would obviously become more and more occupied. It became inconvenient to be always using his hands to "explain" himself; he tended to make his sign language more with his face and finally with his mouth and throat.

Then he made a great discovery! He found that if he produced his sign language *entirely* with his tongue, lips, and throat, and made an emotional cry at the same time, the emotional cry acted as a " carrier wave " for the gesture of the mouth and throat, so that the gesture itself could be recognized by ear,—even in the dark or when his correspondent was far away or even out of sight.

So far so good. But how did our primitive ancestor decide on the appropriate gestures to make with his mouth and throat? Such an entirely new art could hardly be "invented" in the popular sense of the word; it must have grown up by a gradual and natural process out of something which existed before. The answer, I believe, is that man started to speak by imitating with his tongue and other vocal organs the gestures which he had previously made with his hands, or rather with his hands and face together.

Let us see how such a plan would work out in practice. His old, original gesture for "little" would be to represent something small with his hands. His corresponding speech gesture would therefore be to make a small mouth, bringing his tongue forward near his lips and partly closing his lips so as to make a small cavity. His hand gesture for "big" would be one which represented something big; so his speech-gesture would be to make a big mouth, with large opening of the jaws and tongue far back.

It is not necessary to run through his whole vocabulary; but two other instances may be cited for the sake of the sequel. To represent the idea of "dig" or "digging", our primitive friend would no doubt try to dig with his tongue, unless he preferred to represent the idea by imitating the action of a badger,—which is what the Red Indians actually did in their sign language. Let us take the first alternative and try to dig with our tongue. I imagine that we start with the tongue as high as possible, touching the roof of the mouth just behind the teeth, and then drive it down vigorously till the tip of the tongue is behind the lower teeth; then for the upthrow, we jerk the tongue up and slightly backward till it just touches the roof of the mouth again. This series of movements makes a fairly good imitation of a digging gesture.

Lastly we will take the idea of shaking, like shaking a mat. That is simple: the tongue is just shaken up and down inside the mouth so as lightly to touch the roof of the mouth and the floor of the mouth behind the upper and lower teeth alternately.

Now let the reader try these "signs" for himself and see what kind of spoken word results when the gesture is accompanied by a humming sound made by his vocal chords to act as the "carrier wave". The little mouth now makes a "word" like *ee-ee* or *ii-ii* (as in French), according to the extent to which we close our lips. The big mouth makes a word like *aw-aw* or *oh-oh*, in the same way. The digging gesture sounds like *tah-dee* or *tah-ree*; while the shaking gesture makes *olly-olly* or *orry-orry*.

This interesting fact was brought to my notice by Dr. Neville Whymant,—an expert on the Polynesian, Japanese, and Chinese languages,—that in certain early forms of those languages the word for little is *i-i* (pronounced ee-ee) ; big, *o-ho* ; dig, *tadi* (pronounced tah-dee) ; shake, *ore-ore* (pronounced orry-orry).

It can hardly be supposed that these four words have all lasted for a million years or more and really represent the first human efforts at mouth pantomime as a means of expressing human thought. The more probable explanation is that the method of making symbolic or pantomimic gestures with the human mouth and throat is as natural to *hearing* man as the making of corresponding gestures with the hands is to those who are born deaf. If that is so, the same sort of gestures would tend to be invented in succeeding ages. I lately came across a case which gives definite support to this idea. It was that of a boy who, up to the age of three and a half or four years, had not learned to speak his mother tongue (English) but used a language of his own. In that language little was called "ee-ee ", big was called " oh-oh " ; a dog was called " ba ", probably made by imitating the action of a dog in barking ; and so a big dog was " oh-oh ba " and a little dog was " ee-ee ba ".

Many others of the invented words used by children, which have been recorded by such students of language as Professor Otto Jespersen, of Copenhagen, one of the leading authorities on the English language, appear to me to have been formed in this way. The widely used child word " ta-ta " for good-bye is especially interesting in this connection, for it results from a gesture which can be made either with the tongue or with the hand. To say " ta-ta ", we lift our tongue up to the roof of the mouth and drop it down rapidly twice in succession ; to signal " ta-ta " we lift our hand up as high as it will go (without moving our wrist) and drop it down rapidly twice or more in succession. The two methods of hand sign and mouth sign still live on side by side !

It is not necessary to limit ourselves to Polynesian or baby language. Our own English of to-day still bears evidence of the same method of word formation by means of pantomime gestures of the " organs of articulation ". A very large number of our English words can be traced back to what is known as the Aryan or Indo-Germanic family of languages, from which Sanskrit, Greek, Latin, and most of the European languages are derived. Thus the English words anger and anguish come from the Aryan root *agh* or *angh*, meaning to choke or strangle. Let the reader try for himself the gesture of the tongue which produces the sound *agh* or *angh*. Is it not a choking or strangling made by the back of the tongue against the back of the throat ?

Or take the words " apt " or " adapt ", which are derived from the Aryan root *ap*, meaning seize. What is this but a seizing gesture, a sort of snapping, made with the lips and jaw? Our word " car " comes from the Aryan root *kart* or *kal* (R and L are caused by very similar tongue gestures), meaning to move, speed, run. Another root of the same sound means to curve or to roll, whence our words " circus ", " circle," etc. In these and many other words the consonant L, which is produced by a rapid flick of the tongue, denotes movement of some sort; while R, which is a similar gesture but with a certain amount of bending back of the tongue, denotes bending, binding, or enclosing.

About one in every seven or eight of the Aryan roots listed by Dr. Walter W. Skeat in his well-known Etymological Dictionary of the English Language, will be found to bear traces of this same method of formation. The tongue and lips performed the appropriate symbolic gesture, and a " call ", made by the vibration of the vocal chords inside man's Adam's apple, converted the gesture into the spoken word.

CONSCIOUSNESS, MOTATION, AND EMOTION.[1]

By WILLIAM MOULTON MARSTON,

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There is little doubt that American psychology, at least, is coming rapidly under domination of the major tenets of " behaviorism." The most fundamental of these tenets is denial of, or lack of interest in the phenomenon " consciousness ". J. B. Watson, who may properly be regarded, perhaps, as the paternal ancestor of behaviorism as we know it, inveighs against the existence of consciousness with peculiar obduracy. Says he:[2] " Literally hundreds of thousands of printed pages have been published on the minute analysis of this intangible something called 'consciousness' ". And, " In his first efforts to get uniformity in subject matter and in methods the behaviorist began his own formulation of the problem of psychology by sweeping aside all mediaeval conceptions." Watson regards consciousness, apparently, as the most mediaeval of all conceptions, and therefore the first to be thrust aside.

Frequently, when founders of new religious or scientific sects deny the existence of an obvious category of experience, such denial may be traced to an interference by the denied phenomenon with the plans or purposes of the proposed cult. Proceeding upon this assumption, it may be worth while to inquire into the plans and purposes of behaviorism. Watson sums up behaviorism's program very neatly, in a single sentence: " Let us limit ourselves to things that can be observed, and formulate laws concerning only those things." In other words, the existence of any phenomenon which cannot be observed physically, must tend to divert psychology from following the behavioristic formula; and, therefore, the existence of such a phenomenon had best be denied, as a measure of practical efficiency.

The existence of consciousness, then, would interfere with Watson's program only in case consciousness cannot be observed objectively. Watson assumed, apparently, that consciousness is beyond objective observation, and has, therefore, denied its existence. In accepting the impossibility of examining consciousness by the methods of physical science, Watson has put himself in the position of following, most submissively, the concept of consciousness entertained by his pet antagonist, William McDougall. To McDougall, certain aspects of consciousness, at least, (i.e. meaning, value, purpose, and unity of consciousness)[1], have no physical correlates in the brain. Moreover, "The facts of the relation of sensory consciousness to cerebral events thus render the conception of a unitary psychic being, call it soul or what you will, a necessary hypothesis"[2] according to McDougall. It is only this particular variety of super-physical soul-consciousness that is incompatible with physical observation and description of psychical events. But McDougall holds that consciousness must be of this special variety, and Watson seems to take McDougall's word for it.

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[1] The following article will form part of a volume on *The Primary Emotions* to be published during the year 1928.

[2] Watson, J. B., *Behaviorism*, 1925, pp. 5 ff.

Only the briefest consideration of this McDougallian concept of consciousness is required to reveal its salient characteristic. McDougall denies the existence of any physical basis for consciousness, or for a goodly portion of it, quite as vehemently as Watson denies the existence of consciousness itself. We have already guessed that Watson's denial is, in reality, a form of self-protection against the very incorporeality of the concept advocated by McDougall. May not MacDougall's denial of the existence of bodily mechanisms for the soul's higher activities be motivated by a quite similar defensive attitude, assumed in behalf of belief in the soul itself? Surely, if the behaviorists could prove, as they would like to do, that the human body is a machine capable of being influenced only by its material environment, all such concepts of vitalism as the soul, and individual immortality, would have to be abandoned forthwith. Yet postulation of a physical mechanism for every bit of consciousness that may be generated within our physical bodies, no matter whether it be generated by our physical environment, or by the soul, or both, is an hypothesis far from inimical to vitalism. It would seem, in fact, that a sensible soul must greatly prefer a body capable of action and reaction, throughout, in terms of its environment. It is hard to see how any portion of the soul's vehicle of expression which remained incorporeal could be of substantial assistance in that physical self-expression which is usually assumed to be the soul's only purpose of incarnation.

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[1] McDougall, W., *Body and Mind*, 1918, pp. 175, 271, 298, etc.

[2] McDougall, W., *Ibid.* p. 298.

But whatever opinions philosophers may hold concerning such occult issues, psychologists may be perfectly sure that the existence of a soul is rather indicated than impugned by discovery and decription of its mechanism for generating physical consciousness.

No one can be expected to consider without prejudice such a fundamental phenomenon as consciousness until he has first been delivered of the doubts and fears of possible catastrophy to his chosen pattern of conduct, in case one or another intellectual conclusion shall be reached. But, as we have seen, behaviorists and their allies may proceed to observe and describe in their accustomed style, even though there exist a physical mechanism of consciousness to be observed and described. While disciples of vitalism in any of its forms, religious or philosophical, may continue even more efficiently to act upon the assumption that human life is activated by higher forces if the material mechanisms employed by these higher forces can be completely known. With the decks thus cleared for unhampered action, then, let us proceed to a brief consideration of the physical evidence for the existence of consciousness.

Professors of the older school are beginning to experience a considerable degree of bepuzzlement when confronted with the task of convincing a healthfully skeptical younger generation that there is such a thing as consciousness. " What is it ? " ask the student readers of Watson. " Where is it ? Prove to me that consciousness exists ! " In vain does the instructor insist that " everyone knows what consciousness is, because everyone is conscious "; that " many phenomena that cannot be ' kicked ' (seemingly the prescribed behavioristic test for recognizable being), can yet definitely be shown to exist." " Very well," reply the students, " show us, then."

Objective evidence of the existence of consciousness must necessarily be indirect evidence, just as is the case with electricity, Hertzian waves, and even disturbances of propagation in nervous tissue. No wireless wave, electric current, or nerve impulse is in itself sufficiently tangible to be made subject to observation by human senses aided by such instruments as are at present available. The effects of these various forces upon observable materials, however, are accepted not only as proofs of the existence of the forces under examination, but also as scientifically descriptive criteria by which the nature of the causal phenomena may be determined. Thus, an electric current may actuate a voltmeter or an ammeter; a Hertzian wave may produce differences of conductivity within an audion tube; and a nervous impulse may result in easily recorded contractions of a strip of muscle fibre.

If, then, we approach the examination of consciousness with similar objectivity, we must assume that consciousness itself, or the physical mechanism used to produce it, constitutes a definite, physical force, capable of registering its presence and nature by causing changes in some observable material. We may further safely assume that this force, consciousness, if it exists anywhere, is to be found in the more complex reactions of the normal, adult, human being; and that if it fails to exist in any living substance, it fails to exist in plants. These assumptions are of no intrinsic importance, save as they may assist us in narrowing the field of our search for observable, material changes, attributable to consciousness.

Let us, then, seek a characteristic difference, if any may be found, between the chemico-physiological reactions of plants, and the psycho-neurological responses of humans. There are of course, quantitative differences, differences of complexity. But quantitative differences, alone, seem hardly definite enough to constitute a wholly distinct category of phenomena such as consciousness is thought to be. Taking a leaf from the behaviorists' book, let us examine more minutely the reactions of plants and men. One basic difference surely appears. All reactions of plants, both sensory and motor (wherever these two aspects of response can be differentiated within single, primitive, reacting structures) are general reactions of the plant, or plant-part, *as a whole*. There is nowhere to be found within the vegetable reagent any discreet unit of force or change which may be regarded as representative of one stimulus in contrast to other stimuli, or in relationship to the reagent itself. That is to say, every stimulus, once it stimulates adequately an appropriate receptor mechanism, ipso facto merges its identity, within the reacting structure, with the identity of every other stimulus simultaneously influencing that structure. Impulses of conduction cannot remain discreet, or assume unitary relationships with other impulses in any conductive medium which is itself designed to act as an indivisible unit.

The human central nervous system, on the other hand, is especially adapted for preserving, within itself, the discreetness of individual impulses, both sensory and motor. The brain and higher connective centers represent, apparently, the most extreme development of the synaptic type of nervous organization; and each synapse indubitably represents a distinct separation of parts in the total conductive structure used by any given response.[1] By means of this synaptic arrangement, therefore, *each stimulus is enabled to preserve its identity* within the organism of the human reagent; an appropriate group of sensory impulses representing a given stimulus at the central sensory synapses, and an appropriate group of motor impulses representing this stimulus in the various motor centers involved. The evolutionary transition from non-synaptic to synaptic types of nervous system occurs, apparently, in the higher coelenterates.[1] It seems safe to conclude, therefore, that plants and animals biologically below the coelenterates are incapable of harboring within their own organisms unit energy groups representative of particulate environmental stimuli; while the higher coelenterates and animals still more highly evolved, including man, possess synaptic nervous systems capable of representing extraorganically determined stimuli groups.

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[1] Sherrington, C. S., *The Integrative Action of the Nervous System*, 1920, p. 16.

The difference just noted between the responses of higher animals and those of lower animals and plants is not only a difference in type of arrangement of the neural elements involved in reaction, but is also productive of a wholly new type of connective tissue and of conductive energy at the synapses. Langley, Herrick[2] and Sherrington[3] term this new type of synaptic material "junctional tissue", or "membrane of separation". The inter-neuronic energy generated by stimulation of this junctional tissue by a simple nerve impulse is supposed, by Sherrington and other physiologists, to possess entirely different characteristics from the intra-neuronic energy propagated within the individual neurones involved in the reaction. I have suggested, in another paper,[4] that this new, super-neuronic type of energy, found only in synaptic nervous systems, actually constitutes physical consciousness; and I have termed the inter-neuronic type of energy, in its objective aspect, *psychonic energy*, to suggest its possible nature as the physical basis of psychical experience. Any unit of junctional tissue within which psychonic energy is generated may conveniently be called a *psychon*, in contrast to the neuron within which neuronic, or nervous energy is released.

Identification of psychonic energy with consciousness is, of course, highly speculative. But at least it seems clear that psychonic energy caused by the interplay, within the organism, of energy units representative of environmental stimuli constitutes a differential phenomenon characteristic of the types of organism commonly supposed to possess consciousness, and that psychonic energy is a definite, tangible, physical phenomenon, subject to observation —albeit by indirect methods—and to physical description. While nervous impulses must be studied by observing their effects upon muscle fibre, or upon galvanometric deflection, psychonic impulses must be observed and analyzed by studying their effects upon intra-neuronic conduction. If, after such a study, it appears that the outstanding characteristics of psychonic energy resemble the characteristics of consciousness as uniformly reported by introspective observers, the suggested identification of psychonic energy with the physical aspect of consciousness would seem to be somewhat strengthened.

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[1] Herrick, C. J., *Neurological Foundations of Animal Behaviour*, 1924, pp. 104, 114, 115.

[2] Herrick, C. J., *Ibid.*, pp. 104-115, quoting Langley.

[3] Sherrington, C. S., *Ibid.*, pp. 16-17. See also: *Proc. Royal Soc.*, 1925, vol, XCVII, 519.

[4] Marston, W. M., *The Psychonic Theory of Consciousness*, *Jour. Abnormal and Social Psy.*, 1926, Vol. XXI, 161.

I have elsewhere attempted to show that the phenomena believed by most neurologists to be imposed upon reflex arc conduction by synaptic influence are the very phenomena most closely resembling the usually agreed upon characteristics of consciousness. Sherrington[1] has given a full and careful presentation of these synaptic phenomena, including: irreversibility of direction of nerve impulses, temporal summation, fatigability, variability of threshold value of the stimulus, increased dependence upon the blood circulation, and increased susceptibility to drugs, after discharge, marked refractory period, inhibition, mutual facilitation of impulses, and shock. Conscious experiences of motor conflicts, of fusions and facilitations of both motor and sensory impulses, of loss of consciousness due to dimunition of blood circulation or administration of drugs (long before conduction of impulses in the nerve trunks themselves could be affected), of shock, of fatigue, and of temporal summation of sensory impulses, form part of the easily observable, every-day life of all normal individuals. After discharge and exaggerations of refractory period are commonly experienced in connection with marked emotional disturbances. And all these basic characteristics of consciousness, it is to be remembered, are, in their physical aspects, phenomena of psychonic (interneuronic) energy, and not of intraneural changes, or nervous impulses, per se.

There is a good deal of additional evidence which might be adduced, similarly, to show further close correspondence between consciousness, as directly experienced, and psychonic energy, as indirectly, though objectively, observed. On the whole, I am inclined to believe that a very good case may be made out for tentative adoption of the hypothesis that psychonic energy is the physical aspect of consciousness ; and that adequate stimulation of psychons constitutes the mechanism for generating physical consciousness. Were we to go upon this hypothesis, biologically we might define consciousness as discrete representation and interplay of environmentally fixed stimuli groups within the organism. Behavioristically, we should be able to describe consciousness by enumerating all the physical phenomena produced by indiscernable psychonic energy upon observable reflex conduction measurements. On the other hand, Vitalists might conceive that the psychon not only serves as a generator of physical consciousness in response to nerve impulse stimulation, but that it is also susceptible to higher vibrational impulses directed toward it by a super-physical soul. It is conceivable also, that thought waves might occasionally serve as effective stimuli to especially sensitive psychons, as wireless vibrations to a radio detector, thus offering a scientific basis for telepathy. If the soul, or telepathic sender were able to stimulate the proper psychonic tissues with effective impulses of super-physical vibration rate, the desired physical consciousness must inevitably be generated in the receptive subject.

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[1] Sherrington, C. S., *Ibid.*, pp. 14 ff.

SENSATION AND MOTATION

If we pursue further an objective analysis of consciousness by the method proposed, what primary types, or elements of consciousness can be disclosed ? Following such objective method, reference must first be had to the basic types of nerve impulse groups, integration of which produces the psychonic energy units assumed to constitute consciousness.

Biologically, the motor function seems to be primary, and the sensory-connector function secondary. Sponges, for example, possess effectors, but no receptor or adjustor cells. Even in higher animals, many cases may be cited where muscle may act independently of nerve[1] ; and Forbes has pointed out[2] that muscle possesses capacity for the " single type of disturbance common to muscle and nerve fibres."[2] In the synaptic type of nervous system, two structurally distinct varieties of nerve cells exist, sensory and motor.[3] Motor cells possess the larger cell bodies, and are equipped with a richer supply of chromophilic substance. The organization of motor cells, also, seems to differ from that of sensory neurons, the motor paths being prepared for carrying larger and stronger groups of impulses than those transmitted through sensory conductors.

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[1] Herrick, C. J., *Ibid.*, p. 86.

[2] Forbes, A., *The Interpretation of Spinal Reflexes in Terms of Present Knowledge of Nerve Conduction* ; *Physiol. Rev. s*, 1922, Vol. II., 361.

[3] Herrick, C. J., *Ibid.*, p. 237.

In summary, therefore, it may be said that there exist two primary types of nerve impulses within the organism, sensory and motor. Each type of impulse represents one aspect of the environmental stimulus; the sensory impulses representing its intrinsic nature, and the motor impulses representing its relationship to the subject organism. If one of these primary types of nerve impulses may be thought of as indispensible, it must clearly be the motor type. And correspondingly, the integrations of these two types of nervous impulse groups must result in two primary classes of psychonic energy, sensory and motor, with the motor variety of maximal importance. If, then, we revert to our initial hypothesis and assume that psychonic energy is but the physical aspect of consciousness, we must conclude that there exist two basic varieties of consciousness, sensation and motation; and,of these two, motation should be found to be most fundamentally important. Yet in modern psychology we find that the existence of motor consciousness, or motation, is completely and most unequivocally denied. Whence arises this curious situation?

The ostensible reason for denying the existence of motor consciousness, as customarily given in the older days of psychology, when it was thought necessary to discuss the issue at all, was the lack of introspective proof that discernible elements of motor consciousness could be identified in connection with resultant bodily movements. That is, in response to a given sensory stimulus, and with kinaesthetic sensations eliminated in one way or another, an arm or a leg might be moved, yet the subject (who was, of course, prevented from visual observation of his own movement), remained unable to say whether or not any motion had occurred. To be sure, the results of some of these experiments were seriously questioned; and cases, equally valid, at least, were cited by Wundt and others wherein certain paralyzed patients reported "innervation feelings" resulting from will to move the paralyzed members, where no actual movement or kinaesthetic sensations of movement were possible.[1] Similarly doubtful reports concerning observation of, or failure to observe this "innervation feeling" or supposed unit of pure motor consciousness, have been printed from time to time. But, of later years, the issue has given way to other controversies of more simple and immediate interest, and psychology has gone on, serenely, putting up as best it might with a single basic category of consciousness, sensation, into which all conscious experiences have been squeezed, no matter how distorted they have become in the process. It is small wonder that McDougall and others have found some comfort in assuming that meaning, intent, and purpose, and other conscious elements of obviously motor character must depend upon an immaterial basis, since all available material basis has been pre-empted by the greedy presumption of sensation, while to define motor experiences in sensory terms is an agony no accurate introspectionist cares to endure.

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[1] Titchener, E. B., *A Textbook of Psychology*, 1912, pp. 169 ff.

Actually, psychologists seem to have failed to find motor consciousness, all these years, simply because they did not know what they were looking for, and, consequently, did not recognize motation as such, when it was repeatedly thrust upon their attention. From earliest known speculations concerning the nature of feeling tone, or affection, come repeated assertions that feeling tone inheres in sensation, or that the affective qualities of pleasantness and unpleasantness are integral parts of sensory experience. So close has the introspectively observed union between feeling tone and sensation proven, that it has defied successfully the attempts of the most severe logical analyses to pull it apart. Curiously enough, it seems not to have occurred to these psychological analysts to perceive, in feeling tone, the simplest possible manifestation of pure motor consciousness.

Motation has been thought of as a *sensory awareness of movement*, and has, therefore, been sought in the impossible form of consciousnes of passage of motor nerve impulses engaged in skeletal muscular innervations. Psychology has been looking for a sort of *motor-nerve sensation*, informing the subject whenever a motor impulse shall have passed over the nerve trunk under examination. Such awareness, if found, would still be sensory in nature. And were such an element of consciousness as an " innervation feeling " actually to be discovered, it must prove something of a mixture of imagined kinaesthetic sensations informative of movement, and sensory awareness of the object resisting movement (whether a limb of the subject's own body, or an environmental object). Such a composite experience would not, by any means, justify separate classification as a basically unique type of motor consciousness, since all its constituent elements would be sensory. Psychology, it seems, has been searching for a new type of being in the guise of a three-legged man, not realizing that, were such a person found, he would represent merely a monstrosity of the race already known.

There is, of course, a psychological reason for psychology's absorption in sensation to the exclusion of motation. The stimulus to sensation is an obvious, environmental one; while the stimulus to motation (assuming motation to be integrative, psychonic energy in the motor centers) is a hidden inaccessable stimulus, i.e. the particular motor impulses which may flow from the resolution of the sensory impulses evoked in the sensory centers. It is a commonly recognized fact that while a given environmental stimulus always evokes virtually the same sensations on all occasions, these sensations may, at one time, be followed by feelings of pleasantness, and upon another occasion by feelings of unpleasantness. The motor impulses evoked on either occasion can not be directly observed, though I have elsewhere shown the possibility of indirect proof that different motor impulses are, in fact, evoked whenever different affective tones result.[1]

It is not altogether surprising, therefore, that psychology has, like Tito Melema in George Eliot's Romola, taken the seemingly easiest way out of a difficult problem, by ignoring the motor impulse situation altogether, and obtaining a false simplicity of scientific description by attempting to define feelings and emotions in terms of sensory consciousness. What particular motor impulses may be evoked under given conditions of stimulation, however, are facts to be determined by accurate observations of the resulting bodily changes and attitudes of the organism, and these facts cannot be discovered by any amount of analysis of the sensations evoked by a given stimulus, or by analysis of the environmental stimulus itself. Psychology, like a little child, has been able to connect its sensations with causes that it can see and touch, but it has been unable, as yet, to connect its feelings with causes that are hidden and inaccessible. Whereupon, again like a little child, psychology has argued that feelings are just another kind of sensation, and that feelings, therefore, also spring directly from that easily knowable cause, sensory stimulation.

Motation and Emotion

Denial of the existence of motor consciousness has brought psychology to an impasse in the field of affective and emotional theory.[1] C. J. Herrick[2] and other physiologists, R. S. Woodworth,[3] W. W. Smith[4], and many other writers arrive, perforce, at the conclusion that unpleasantness is somehow brought about by conflict of motor impulses, and that pleasantness is produced either by an absence of motor conflict, or by an actual mutual facilitation of motor innervations. Herrick expresses his conclusions as to the physical basis of unpleasantness in terms of central blockages and stasis. Woodworth contents himself with the assertion that "pleasantness goes with a neural adjustment toward letting things stay as they are; while unpleasantness goes with an adjustment toward riddance." Smith clearly refers "negative feeling tone" to conflicts between motor impulses, and somewhat less clearly attributes "positive feeling tone" to absence of conflict, or perhaps to harmony between such impulses.

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[1] Marston, W. M., *Motor Consciousness as a Basis for Emotion, Journ. Abn. and Soc. Psy.*, July, 1927.

[2] Herrick, C. J., *Introduction to Neurology*, 1920, p. 285.

[3] Woodworth, R. S., *Psychology*, 1925, p. 178.

[4] Smith, W. W., *The Measurement of Emotion.*

Smith fails to identify "positive" tone completely with pleasantness, or "negative" tone completely with unpleasantness, for the reason that he finds positive tone sometimes associated with impeded recall of memorized words, and negative tone sometimes associated with facilitated recall of similar words. This common difficulty with a facilitation-conflict theory of feeling tone is obviated by recognition of the fact that it is not the actual motor impulse that wins through to expression which alone is the correlate of pleasantness or unpleasantness. The feeling tone consists, rather, of the psychonic or integrative product of the observed motor discharge and of the other component motor impulses which may be suppressed, or which may be allowed to take temporary precedence over the principal response, for the purpose of producing pleasantness. In either case, the quantitative measurement of the explicit motor discharge can not be taken as symptomatic of the type of motor impulse relationship which obtains in the motor centers involved.

It can be seen, therefore, that while many writers are in substantial agreement as to the physical basis underlying pleasantness and unpleasantness, there still remains the necessity, if psychology's present tenets are to be upheld, of translating motor conflicts and facilitations into terms of sensation. Attempts to perform this miracle have proved rather dismal. Smith, for instance, proposes a most ingenious and elaborate scheme of conflicting or harmonious patterns of visceral sensations, brought about by bodily changes produced by the fundamentally conflicting or harmonious motor impulses first considered. Aside from the impossibility of such diverse, visceral, sensation patterns being produced by autonomic innervations, (according to Cannon[1], and others), we are confronted by the peculiarity that Smith's theory supposes that all these visceral changes, with resultant sensations, are brought about by *subliminal* motor impulses. Either we should have to wait a long time for temporal summation to produce the " sensations " of feeling tone, or else we should be compelled to assume that the subliminal impulses mentioned by Smith must possess quite extraordinary potency in being able to produce the sensations in question without themselves rising above the threshold of motor discharge.

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[1] Cannon, W. B., *Bodily Changes in Pain, Hunger, Fear and Rage*, 1920.

The famous James -Lange theory of emotion has kept psychology in a continuous muddle for over thirty years, because of its similar attempt to drag motor reactions to emotionally exciting stimuli into consciousness by way of sensations resulting from bodily changes brought about by the original motor impulses. This theory, in its original formulation at the hands of William James, expressed a valuable thought. James said that bodily changes, or motor responses followed immediately the perception of an exciting fact, and that the perception of these changes, *as they occur*, is the emotion. Obviously, if perception of bodily changes must await the rising of resulting sensations to consciousness, one cannot be aware of the changes *as they occur*. If, on the other hand, the motor impulses rise to consciousness upon their initial integrations, in the motor centers, into psychonic impulses, then not only may we be aware of the motor responses *as they occur*, but also, in all probability the complex motor consciousness thus arising " IS the emotion," just as James himself suggested. What a quantity of paper and printer's ink might have been saved, had James only gone one step further and boldly defied psychology's taboo on recognition of motor consciousness !

In conclusion it may well be emphasized, once again, that the simplest form of motor consciousness introspectively discoverable is affective tone. There seems to be no simpler, or more unitary element to be sought after than pleasantness and unpleasantness, just as it is difficult to conceive a simpler integrative compound, in any psychonic impulse, than two motor impulse groups in alliance or antagonism. (The simplest elements of sensory awareness, similarly, probably represent combinations of two or more afferent nervous impulses of origin; but that problem need not be discussed here.) Integrations of more complexly related motor impulses into psychonic energy units may give rise to the consciousness of the " coarser ", or primary emotions.[1] And, finally, very complex psychonic impulse units, in which, necessarily, the constituent energy elements are less intense and more nicely balanced, may be thought of as bringing to consciousness the finer, more delicate and ephemeral, or " higher " emotions.

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[1] Marston, W. M., *Primary Emotions, Psy. Rev.* July, 1927.

Intents, desires, purposes, meanings, and psychical values would all take their places, in the schemata of consciousness herein proposed, as hybrid units of consciousness containing both motor and sensory components.

It should also be noted that such an hypothesis as the psychonic theory of motor consciousness, if used to explain the physical basis of emotion, eliminates the necessity for postulating inherited, central "patterns" of nerve cells especially appropriated to particular affects, or emotions, and opens the possibility that psychonic, or integrative relationships between motor impulse groups, upon which feelings and primary emotions are based, may occur upon the psychons of any motor center available to adequate motor impulse groups appropriately related. In short, no further structural inheritance need be presupposed than that of the normal central nervous system, capable of functioning as it is now known to function. This possible simplification of the present concepts of emotions and instincts, alone, would seem to justify experimental testing of the theory herein proposed.

But the most grateful feature of the motor consciousness theory would seem to lie in its accord with common sense and everyday experience. It amounts to an admission that when one seems to become conscious of various feelings and emotions *as they occur* such consciousness is not the result of retrospective imagination, of a sensory variety. Direct consciousness, in fact, of that motor half of ourselves so long proscribed by psychology ought to prove most refreshing and beneficial to all concerned.

THE DOGMAS OF SCIENCE.

By WINTHROP PARKHURST

I

Superstition (boldly to paraphrase Descartes) is of all things among men the most equally distributed; for every man believes his neighbour to be so abundantly provided with the commodity that, were its division put to a vote, human suffrage would prove it equably apportioned. And what is universally maintained, one may properly suspect, can not in decency be doubted by an individual.

There is, in truth, no man so superstitious himself as not to feel that his friend is yet more gullible. In the rival contentions of each, that the other is excessively obsequious before the ridiculous, no mild mirth lies in store for the spectator. Assuredly it is ludicrous that any man should wear a four-leaf clover as a talisman; clearly it is preposterous that another man should avoid walking under a ladder. But that the first should smile with condescension at the second, that the latter should cast a backward grin at the former—here, truly, is a parade of comic grandeur. At such a spectacle, we may safely surmise, are cachinnations loosed by all the gods on Olympus.

If there is high comedy, however, in a man's rapping his knuckles on a nearby table while he remarks, with sincere scorn, that his own fortunes have always been excellent without this truckling to ladders and four-leaf clovers (*rap! rap! rap!*), still more exalted comedy awaits us in the rival boasts, not of individuals but of institutions. And by no two institutions is such comedy brought to so lofty an estate as by what may broadly be denominated theology and science.

Of late years, it is true, these immemorial antagonists begin to regard each other with indulgent, even friendly, glances. A case in point is the canonizing of the shade of Charles Darwin, formerly a little brother of the devil, though more recently the wronged cousin of an angel. For none less than Bishop Manning himself has laid his official blessing on evolution. "There is nothing in the Christian faith," he announced recently, "which conflicts with the scientific theory of evolution. To many of us this hypothesis seems to make clearer both the glory of the Creator and the naturalness of Himself in the Incarnation." Remembering what Bishop Wilberforce not so long ago said on the same subject to Huxley, one is engaged by the swift progress of God's stewards.

Again, from the opposite trenches, with this abatement of hostility toward a scientific doctrine, scientists themselves sprinkle holy water on their gunpowder. That is to say, conparatively few labourers in the scientific vineyard nowadays mock at the dogmas of religion. A number of eminent physicists, as a matter of fact, are confessedly orthodox. Their nominal orthodoxy derives chiefly from the two reasons, first, that orthodoxy is more heterodox than it used to be, and, secondly, that modern physics is more sophisticated, and hence is less naïvely materialistic, than it used to be. The atom of Lucretius and Democritus, and the physicist's atom until almost the close of the last century, was an invisible but quite matter-of-fact lump of substance. The atom, to-day, is a mere name for a congeries of electrons—themselves simply quanta of energy. Materialism as crudely interpreted by Büchner and his colleagues—that materialism by which the Church was ever affrighted—is thus replaced by a more ingratiating "energism". And this shift in scientific outlook serves not only to placate the theologian, but also to oil the friction points between science and religion and so to allow physicists like Millikan—without jeopardizing their professional standing—to grant that numerous spiritual dogmas seem reasonably valid.

In a word, then, preachers are less petulant, and scientists are less prejudiced, than they were formerly. Physics has matured, and in maturing has sloughed off, like the warts of an adolescent, certain postulates particularly objectionable to prelates. Meanwhile, theology has concurrently grown more gracious; not only have some of its own dogmas vanished, but several heretics have been brought into the fold, albeit posthumously.

One is tempted to view this process of reconciliation with an optimistic eye. One is even tempted to predict that, like the lion and the lamb, scientists, sacred and profane, are shortly to lie down together in perfect amity, blending a corporate roar and bleat in soothing concord. Unfortunately, although there are some reasons for previsaging such a millenium, there are reasons also for fearing that it must be preceded, even as the prophets themselves feared, by an Armageddon. For, in the first place, the theologue accepts the teachings of the scientist only when they are not in open conflict with religious precepts. And, in the second place, the scientist accepts the preachings of the theologue only when these are not in open conflict with empirical research—or when hieratical conclusions can be amiably confused with purely ethical. Inasmuch as there is no positive scientific evidence at all against harps and heavens, and for the reason again that few preachers denounce molecules along with monkeys, there is ample room for a surface show of professional brotherhood.

Aside from this external agreement, however, which is largely the *laissez-faire* policy of gentlemen, it is difficult to find a solid *entente cordiale* between the professors of transcendental and terrestrial mechanics. Nor can it be doubted that animosities, at present in abeyance for reasons into which it is needless to enter, will again break through the polished surface that now confines them—in a word, that back-scratching will sooner or later become backbiting.

That compliments will be exchanged less frequently than they now are when theologians and scientists begin to realize that their dogmatic strength is the logical weakness of their opponents, is a close thing to a certainty in a contingent universe. But if, wishing to forestall attacks, science and theology privately reconnoitre up the back alleys of the enemy, there is an external danger which always threatens to force both armies into the open. Indeed, even if both should ultimately be content to cry 'stalemate', that danger will force them onto each other's backs in a defensive warfare. (We are all honourable men, and all wars, needless to say, are defensive.)

That danger, of course, is philosophy. Himself a peace-loving mortal, the philosopher tends to precipitate proceedings because it is his habit to ask all disputants obnoxious questions. Theology, the scientist says, is built on dogmas. But, queries the philosopher, is not science itself built on dogmas—that is to say, on undemonstrated and even undemonstrable assumptions? Lost in pardonable wonder before the towering heights of his scientific cathedral, does not the scientist ignore the strangely gossamer-like mental tissue which upholds it? Does he not (the philosopher persists) even affirm that it is no gossamer at all, but solid granite?

Of recent years, especially since the dissemination of Einstein's doctrines, scientists have grown less audacious in asserting that physics actually holds up what it stands on; for the principle of relativity have brought to the fore, challenging the first-line trenches of classical mechanics, a principle as aged as philosophy —the principle, to wit, that what is to be observed logically calls for an observer. And because this principle has latterly been promulgated in scientific language, which induces greater confidence than philosophical, the public has rallied around it with interest. It is no longer soft-headedness, men begin to realize, but simple hard-headedness to admit that what we see *does* depend upon where we are standing. Nevertheless, things grow crooked at this important juncture. For science, due to some curious psychic intertia, still maintains that, although seeing is certainly believing, neither standing nor sitting down has any real influence on what we look at. There is still, behind that panorama of shifting appearances, something which never is seen but which never alters.

Because this remarkable dogma is seldom brought home forcefully to the reader, who therefore is seldom shocked into an examination of his faith in it, a brief collision between him and it may prove stimulating. As perhaps no other single experience can do, it will furnish him with a fresh outlook, or with the material for a fresh outlook, on nearly every one of the facets of his existence. For this reason Einstein's doctrine must be regarded as possessing supreme cultural importance. Through scientific channels it is drawing widespread attention to an ultimate and the greatest problem of philosophy—the relation of consciousness to the elements that enter it.

But besides the central dogma just touched on—a dogma which stands unshaken to-day despite the number of scientists calling themselves Einsteinians—there are other dogmas of science which, individually less comprehensive, are much more numerous. Collectively they are almost equally potent, and, in their last consequences, equally poisonous. They prevail in contemporary scientific thought, and so hold sway over general thinking, to an extent that is seldom admitted and more seldom advertised.

It is the outstanding of these derivative dogmas which we are to look at. The dramatic consequences arising from assumptions which are scattered with a free hand throughout science are well worth occasional study by the public. In any age they would invite public inspection. They invite it especially in an age like the present one, when the industrial value of modern physics has turned the physicist into a recognized arbiter of nearly everything.

II

As in the case of the individual theologian whose beliefs are not held throughout by his frocked companions, the assumptions of one scientist, it is to be noted at once, are seldom supported in their entirety by all his colleagues. The doctrinal variations of religious sects have some striking parallels in the domain of natural science. For example, we find, and we also do not find, the aether. Again, we find, and also we do not find, absolute motion. One need not multiply these instances of doctrinal divergence. The two mentioned will serve excellently for a multitude.

But whilst it is thus true that all scientists are not of one uniform opinion, it is equally true that, underlying all such differences, there abides a yet more noteworthy agreement. Though some affirm that motion is merely relative, and some that motion is absolute; some that an aether is indispensable, and some that, if anything at all, it is but a vast fog emitted from the brains of its believers, scientific opinion nevertheless grounds itself on several very plain points of concord. The very asperity with which minor doctrines are attacked and defended throws into relief the larger issues which virtually not one scientist will dissent from. Motion may be relative or absolute, for example: that there is *some* motion every scientist is vehemently certain.

It is no difficult task, then, to draw up a list of postulates to which scientists subscribe universally. Matter, Motion, Space, Time, Energy—here are five terms invoked without respite. Root out one of these terms from the scientist's vocabulary, and you will reduce him to pitiable stuttering; root out all five, and you more kindly would have extirpated his cerebrum. By the simple extraction of these five vocables the havoc wrought on his profession is appalling. Refuse him the word Space—and matter is murdered on the instant, for matter is that which has extension. Deny him Motion—and kinetic energy evaporates without formality. Even potential or latent energy—energy said to reside in a stone that has been balanced on the edge of a precipice—fades away like the cat's grin in *Alice in Wonderland*; for potential energy is meaningless unless it once was, or may become, kinetic energy.

Now, the foregoing terms are not only the words on which all scientific speech is ultimately builded: in the opinion of nearly every scientist they are terms which are incomparably lucid. Scientists are extremely proud of the simplicity and lucidity of their language. They consequently tend to turn a cynical eye upon the speech of the Church and its vested spokesmen. When the theologian discusses, for example, the structure and function of the Trinity, he is privately suspected, if not publicly accused, of hiding what is already far from clear behind immense clouds of inordinate verbiage. Where the scientist talks briefly and plainly (so it is said, or thought), the ecclesiastic is both complicated and hazy.

This particular opinion is held extensively, nor is it confined by any means to the ignorant. Nevertheless, as we shall see, it is erroneous. For strictly scientific speech, in the first place, is incomprehensible to all save the initiated. And, in the second place—that is, when the scientific tongue has been done into the vulgate—these more comfortable dialects do not so much simplify the problems uinder discussion as conceal the great difficulties surrounding them. A natural but very misleading belief is thus engendered that everything has been made clearer than daylight.

Of the two points just made, the first can be illustrated without trouble. It is only necessary to compare language used within the inner circles of theology and science to see that the one idiom is fully as mystifying as the other.

Two hundred and fifty years ago, in a voice we still can hear shaking with indignation, Thomas Hobbes burst forth with the following:

> What is the meaning of these words, *The first cause does not necessarily inflow anything into the second by force of the essential subordination of the second cause, by which it may help it to work*? They are the translation of the title of the sixth chapter of Saurez' first book, *Of the Concourse, Motion, and Help of God.* When men write whole volumes of such stuff, are they not mad, or intend to make others so?

Yet if the majority of us share the indignation of Hobbes, feeling deeply for him, what are we to feel for ourselves in the presence of such a passage as this one?

> The ventral rami of the pubes are short and, like those of the ischium, they are united throughout their length in a long symphasis . . . The cotyloid ramus of each ischium gives off a stout mestichial process backwards.

Is this second excerpt much clearer than the first one? It is safe to say that none but an anatomist would so deem it. Nevertheless, although the first is from the pen of a Schoolman, whom some believe to have specialized in obscurity, the second is from the hand of a scientist generally and justly conceded to be the most lucid of all writers on his own subjects—Thomas Henry Huxley.

Again, compare a brief passage from Thomas Aquinas with (say) a passage from Richter's celebrated treatise on organic chemistry. Attend first to a remark by the angelic Doctor.:

> The One adds nothing real to Being, but simply the negation of division . . . Hence it is manifest that the being of everything whatsoever holds together by its indivision; whence it is that everything in the same manner as it preserves its being, so preserves its unity.

To which the chemist may excusably retort:

> That may be just as you say. But what *I* am telling you is this: 'While the aliphatic monocarboxylic acids or the paraffin carboxylic acids could not be obtained by oxidation of the paraffins, the aromatic acids can readily be obtained from the benzene homologues by oxidizing the side-chains to carboxyl groups . . . In substituted alkyl benzenes the alkyl group is prevented from being oxidized by chromic acid if a negative group occupying the o-position with reference to the alkyl group is present.'

Between the respective obscurities of such passages as the foregoing, the novice is in a pretty dilemma. If perchance he should survive the one passage, he assuredly will perish by the other.

III

We turn now to the second assumption: the assumption that when scientific nomenclature is duly simplified all obscurity, all uncertainty, vanishes. Here also is an assumption sustained daily by otherwise intelligent men in many quarters. Pausing to examine it with care will prove interesting.

When the theologian says, for example, that "God moves in a mysterious way, His wonders to perform," he is held to be giving voice to a hazy dictum. By contrast the physicist speaks with extreme clarity. What could be more precise, more illuminating, more perspicuous, than the physicist's statement that, when a brick falls to the ground, it falls with accelerated motion? Surely we have here a simple statement of plain fact; there is scarcely one appealing more directly to human intelligence.

In such a statement, however, the philosopher scents the aromatic bones of an ancient dogma.

"You say (we may fancy the philosopher to argue) that a brick falls with accelerated motion. Now that is an interesting statement if there ever was one. First you speak of a brick. Then you tell me that this brick is in motion. You imply by this, if I understand you aright, that the motion and the brick are not identical. I might point out that what you signify by *brick* is somewhat less clear than you may imagine. However, I shall confine myself exclusively to the motion.

"Therefore, I must first of all ask you what you mean by saying the brick is in motion. Mind you, I am not trying to trick you with a play on words: I am taking words exactly as you use them. You agree that the brick and the motion are separate problems. Very well; please tell me something about this separate motion. The brick may, or may not, be in motion. If the brick is in motion we say, truly enough, that it is moving. On the other hand, if it is *not* in motion we say, just as truly, that it is stationary. It follows, then, that the brick and the motion can be separated; for if a brick and motion were never separated, no brick would ever be stationary. Tentatively, therefore, I agree with you: the brick and the motion are not identical.

"By itself, then, please describe this motion which is separate. Describe it in any way that is most convenient. . . What is that? You say that motion is what a moving body possesses?

Being only a philosopher, I am doubtless too dull to grasp your meaning. Just now you told me that a brick and motion could be separated. Now you tell me what happens when the brick and the motion are together. Yet they are not always together —this you have just admitted—for otherwise all bricks would be always moving.

"You can not, after all, describe this motion? You perhaps erred in admitting that the brick and the motion could be separated? In that case, as you must admit, no brick is stationary.

"Well, that is a rather curious conclusion, inasmuch as you have told me nothing at all about motion. However, allow me to ask you one more question. Thereafter I shall not trouble you with my dulness. You remarked that bricks fall with *accelerated* motion. Sometimes there is much motion, sometimes little, for in falling to the ground a brick acquires *more and more* motion. But you previously said that motion, apart from the brick, you could tell me nothing of; that, as something separate from the brick, it was indescribable and, as far as description goes, non-existent. In falling to the ground, consequently, it seems that a brick acquires more and more of that motion which, until the moment of being acquired, was literally nothing.

"Now really—I ask you in all fairness, if you wish to make a statement so preposterously devoid of all reason? Remember: motion apart from the brick is not admitted. You agreed to this as soon as you realized the utter impossibility of talking separately about motion. And yet what do you now tell me? You tell me, fantastically enough, that in falling to the ground a brick acquires more and more of that very thing which, until the brick *had* acquired it, was non-existent. Truly, if you deem me a wordy fellow, what am I to think of your own gift for verbosity?

"Well, since you ask me, I shall give you my opinion. You have never devoted five minutes' consideration to a single one of the words you have been using. Motion—not to mention Space, Time, Energy, and so on—you have always considered clear words simply because you have been brought up in a belief in their simplicity. You all but say, 'Well, anyway, motion is motion.' As well might you murmur with the Arab, 'Allah is Allah,' or grunt with Dr. Johnson, 'Matter is matter.'

My earnest advice, for your future guidance, can be put briefly. Either define every word you are using, so that you are honestly satisfied with its definition in all particulars, or else admit (as you often must admit) that you can not do so. In many instances you will be unable to do so because every word defined leads straight on to some other word which in turn leads on to yet another. And such a word as *motion* will thus lead you back, after devious turnings, again to motion. The significance of your home-coming is not mysterious. Nor should it be, if frankly admitted, disheartening. Your return is both baffling and discouraging only when, denying that you have started off without preconceptions, you hope to come home without dogmas in your breast-pocket.

"Scientific language is supposedly pure description. But it is pure description, and true explanation, I would have you observe, only in terms of certain dogmas first conceded it. Space, Time, Mass, Motion, Energy—in one or more of these indemonstrable concepts every single statement of the physicist is finally rendered. And just because scientists use these words continually, and because never is one explained save by falling back without delay upon another—does this not constitute the clearest evidence that without such words natural science could never function? Does it not make clear that scientists are concerned, not with defining the ultimate concepts these words stand for, but with describing human sensations merely in terms of them?

"In fine, does not all I have said convince you at last that dogmas are the starting-point of natural science? I believe that when you have considered the problem you will agree with me. And I am confident, furthermore, that you will then begin to see how one dogma supports and comforts another. You will then begin to realize, as even yet you do not, how fantastic you waxed in speaking of accelerated motion—as if, forsooth, you had actually seen this thing which you are unable to describe at all growing greater and greater. And you will finally begin to understand how more than bizarre was your speech in taking Time and Space (both indemonstrable by reason and undiscoverable by the senses) and then multiplying these invisibles together in order to produce, by this fabulous marriage, motion.

IV

Here, since the ideal of science is to explain all phenomena in terms of the motions and masses of particles, the dogmatic groundwork of natural science is made apparent. But even after we have granted the physicist his trinity of Space and Time and Motion he will remain at a serious loss to justify many derivative dogmas. In conclusion it will be instructive to glance at a few of them.

Abiogenesis, for example, is a pretty dogma. It is the biologist's name for what more generally is called spontaneous generation.

It is true that no reputable modern biologist believes in it; for, thanks to Nineteenth Century experimenters,—notably Redi and Schwann and Pasteur—it has been shown that spontaneous generation is impossible. Without life to begin with no life, according to the most elaborate experiments, followed. And this discovery was duly canonized by science. Yet no sooner was this biological doctrine established than the reverse of it was deemed equally important. Why? Partly for the reason that, on the affidavit of geologists, the earth was once too hot for living organisms; and partly also because biologists were averse to the Mosaic dogma of a special creation. Does this then mean that spontaneous generation is currently accredited? Not at all. What it does mean, oddly enough, is that though life *now* comes exclusively from living organisms, it issued originally from matter that was not living. And the only method science has of countering the paradox is to assume that the earth, "once upon a time," was in that precise thermal and chemical condition which was propitious to that spontaneous generation it now ridicules.

Of dogmas respecting the manifold aethers which the fancy of physicists has produced generously, there is unfortunately no room at all for adequate discussion. Neither is there room for even sketching another grand dogma of science—the dogma, to wit, that bodies act upon each other without any intervening medium whatsoever, a dogma derived from the curious belief that a body, utterly powerless to move itself, is always ready and competent to move its companions. But from several other dogmas beseeching scrutiny, a remarkable one may be noticed in closing. In strict accuracy it is a dual dogma, not a single. Reference is made to the Conservation and Dissipation of Energy.

As it is generally known, the Law of the Conservation of Energy is a statement that energy is indestructible. Lift a stone. The energy of your arm which elevated it was derived from the food you ate previously. Now drop the stone. It falls to the ground and, in falling, delivers all the energy you stored within it. This kinetic energy—the energy of the stone in actual motion—becomes molecular motion or heat, however, when it and the ground collide finally. Furthermore, should all this heat be gathered together and turned back again into kinetic energy, there would be just enough to raise the stone to its former position. Energy is thus said to be eternally conserved because it turns into heat when it appears to vanish. And upon the ceaseless working of this Law of the Conservation of Energy the larger part of the science of mechanics is dependent.

But here, again, we are confronted by a startling parodox.

For no sooner are we told that energy is eternally conserved than we are told that it is eternally being dissipated. It is dissipated for the reason that, though kinetic energy becomes heat, and heat can again become kinetic energy, a certain amount of energy is lost for ever. That is to say, a certain amount of heat can never be converted into kinetic energy, for, in the very act of becoming energy, some additional heat is being created *by* that energy. In scientific language, the entropy of the universe tends toward a maximum. In ordinary language, which means exactly the same thing, all the kinetic energy of the universe is steadily, if slowly, becoming heat, and this heat will sometime be everywhere equal. And this process of degradation or dissipation is just as continual as the conservation of energy.

A natural question, therefore, arises. If such a process has always been in progress, why has not the universe already reached this lamentable stage of thermal uniformity? If there was a given amount of kinetic energy to begin with (as far back as you care to push your speculations), why has it not all become heat long before this moment? The physicist is inconveniently silent on this problem. The very best he can do—and in doing so involves himself in a new predicament—is to affirm that the original amount of kinetic energy was " infinite ", so that, irrespective of the amount which has been dissipated, there still remain inexhaustable stores to fall back on. But in that case, unfortunately, there always will be some energy remaining to be dissipated; and this patently contradicts his earlier statement that ultimately the temperature of the universe must become uniform.

In other words, talking about " infinite " energy plainly confounds the alleged consequences of its dissipation; on the other hand, without postulating an " infinite " amount of kinetic energy, he can not explain why it already is not dissipated; whilst, on the third hand, so to speak—a hand that is extruded by philosophy —the notion of infinity itself may be called in question.

V

Into this notion of infinity (which, it may be parenthetically remarked, virtually every problem in all the sciences is eventually referred to) we have no opportunity to push our present inquiry. What we have seen already must suffice for our purpose.[1]

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[1] On this curious panacea for scientific heart-aches the reader is referred to ' Infinity and the Infinitesimal ' by Winthrop Parkhurst and W. J. Kingsland jun., published in the *Monist* for October, 1925, July, 1926, and January, 1927—an historical, logical, and psychological examination of these two concepts, the simultaneous impotence and popularity of which render them almost uniquely valuable in the psychoanalysis of some modern philosophers and most scientists.

That purpose has been neither to cast ridicule on the discoveries of science, nor to question the plain value of continued research. Experimental inquiry is the only sound method of discovering what sensible events will follow others—of finding out what we are likely to see, hear, smell, taste, and touch provided, after having certain of these sensations, we do so and so. It is a procedure to which none can take exception.

What have here been called the dogmas of science are those concepts into which is poured this stark testimony: assumptions of space, time, and the like, which no scientist is under contract to explicate, since the world willingly receives evidence in terms of them, but assumptions which science itself can not make as long as the insensible and indemonstrable portion of its testimony is not admitted. Naïve confusion of that which is taken for granted with that which is a palpable phenomenon has worked an amount of mischief that is incalculable. Thanks to it science has proceeded, without a qualm, to lay down final principles which are themselves simply the outcome of these original dogmas. And thanks to it, again, the world at large accepts the conclusions of science without question. It is no exaggeration at all to say that the majority of cultivated men suppose that scientists talk of nothing but sensible phenomena. That scientists talk of much else besides sensible phenomena, though pretending most of the time that they do not, and even ridiculing certain gentlemen who frankly do so—what else have we were but an enlarged copy of the four-leaf clover gentleman whom we caught marching right valiantly under a ladder?

Indeed, one who is interested in drawing parallels between theology and science will find a great number lying ready for his pencil. Is the scientist unable, for example, to discover an over-abundance of logic in the Trinity? What, then, of his own triune homologue—Space, Time, Energy? Space, which is omnipresent and the container of Energy, reveals itself through this Energy become incarnate in Motion—which is simply Space, Time and Energy in compound. Is there not here, in the name of Abelard, an arresting echo.

Such a parallel as the forgoing, it is true, theologians are too avid in seizing upon; and their endeavour to justify their own dogmas by pointing to logical counterparts in the sciences betrays a naïve belief, fortunately not shared by most scientists, that the best way to explain mysteries is to multiply them. Nevertheless it remains a fact—albeit a fact offering chill comfort to the theologian—that, if we first exclude from theology all those assumptions the Church borrows boldly from the Laboratory, we shall find neither more numerous nor more grievous dogmas in the one temple than are found, upon due inspection, in the other.

A CRITIQUE OF DYNAMISM

By SCOTT BUCHANAN

In the course of making a revised version of Aristotle[1], I rather casually interpolated some teleological terms which are usually associated with possibility when it takes on metaphysical significance. The metaphysics that results is often called *dynamism*; the term is derived etymologically from the Greek word which means possibility or potentiality. Perhaps the reason that possibility is avoided in contemporary science is the supposed bad company it keeps in metaphysics. I do not intend, however, in this paper, to enter the field of metaphysics proper. I shall stay within the methodological universe of discourse in spite of the fact that I shall talk about metaphysical problems. What I have to say will be no more than a few suggestions for method in dealing with two problems of metaphysics; teleology is one of them, and that will involve the other, internal and external relations. Please note the warning that I am not expounding a metaphysics, and, therefore, will not give any complete treatment of these problems.

A superficial examination of the methods of Spinoza and Leibniz will supply a background for these suggestions.

Spinoza was a lens-grinder in an age when telescopes and microscopes were the newest fashion in scientific instruments. Spinoza may therefore be imagined to have had an interest in optical phenomena, and to have been aware of the beautiful and rather fruitful analogy between light and knowledge and, if we may trust Plato, existence itself. We may suppose, then, that he expanded a simple analysis of light phenomena to the dimensions of a metaphysics of being. There seems to be some basis for this interpretation in Spinoza's letters, but one could have guessed it without such evidence.

Suppose he followed the method outlined in this essay. The parameters involved in his explanation of light phenomena would be ' source of light ', ' light rays ', and ' things illuminated '. These could be defined carefully and shown to have an order of dependence in which ' source of light ' would hold the highest, ' rays of light ' next lower, and ' things illuminated ' the lowest positions with respect to identity conditions and fields of variability. Relations of inclusion and subsumption might be expressed as independence, dependence, and necessary connection, so that one might say that illuminated things depend on rays of light and these flow by necessity from the source of light. If these statements dropped their special applications and were expanded, we should have Spinoza's metaphysics of substance, attributes, and modes. The definitions in the first book of the *Ethics* would express the result.

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[1] This will appear as a Chapter in my forthcoming volume *Possibility* in the International Library of Psychology, Philosophy, and Scientific Method.

By substance I understand that which is in itself and is cenceived through itself, . . .

By attribute I understand that which intellect perceives of substance, as if constituting its essence.

By mode I understand the affections of substance.

These definitions also express the relations of possibility and actuality in the judgment, which like Spinoza's intellectual intuition acts as a kind of lens bringing them to a focus in experience. Actuality is a substance having infinite attributes or essences which are systems of possibility, determining particulars or modes as sub-parameters or potencies. Further, various interpretations of Spinoza make the confusion which I have pointed out between actuality and possibility. The naturalistic interpretation identifies substance with modes, and thus makes Spinoza a pantheist; idealists make Spinoza an idealist by identifying substance with the attribute of thought.

But I am interested in the teleology in this system. Some will object to any association of Spinoza with teleology, and quote the Note at the end of Book I of the *Ethics* to support their objection. I believe that it is not relevant. He is there arguing against a misuse of final causes which was current in the scientific controversies of the time. Some supposed final causes were coordinate with and substitutes for efficient causes. As such Spinoza quite rightly said they are imposters. He is arguing against a misconception which is current even to-day among those who would reduce human purposes to particular neutral activities of the body. Final causes are not modes, he is saying. We would say they are not sub-parameters. Rather they are essences, or systematic functions of which modes or sub-parameters are particular and subordinate determinations.

Spinoza's teleology is formulated in Book V where all the previous metaphysics becomes a way of life, whose end is the intellectual intuition and love of God. When modes by means of attributes are seen in God, their true nature is revealed as means for the achievement of values whose source is God. In our terms parameters are purposes organized in subordination to higher purposes which in the judgment are values in the individual whole of observation. If the transition is not clear now, it will become so in what follows.

We may imagine Leibniz to have started his metaphysics by generalizing another case of analysis, the development of the differential calculus. Given the problem of measuring irregular figures, the method of the calculus says to divide the curve progressively into smaller and smaller segments until you have reached infinitely small segments. If the general character of these can be determined in a functional form (and this is possible by means of the proper equations and their differentials), then you have a very accurate knowledge of the curve in terms of its smallest parts. Or this statement may be inverted by saying that you will have a very exact knowledge of each point of the curve in terms of its systematic relations with every other point. For the sake of simplicity I am not mentioning the difficulty in the notion of infinitesimals. It will be seen that this is very close to the application of the notion of parametric analysis where an analytic system is assumed equivalent to an individual whole.

Leibniz may be imagined to have taken this case and generalized it to cosmic significance by substituting monads for points or infinitesimals, and these have perspectives of the universe, or systematic relations with all other monads, or points. These perspectives or systems are the possible worlds which he substituted for the equations expressing the forms of the curves. God is the King monad and the Pre-established Harmony in His mind, the system of all systems. Here again is an alternative metaphor for expressing the actual whole (God), possible wholes (possible worlds), and the aggregate (monads). The metaphors would have to be revised to render them strictly intervalent with mine, and there are also some discrepancies in the logic. I shall again emphasize the teleology in this system and leave the rough analogy as a background.

God is the final cause of the universe, and by the overflowing of His power transforms the world systems into a Kingdom of Grace, or a teleogical system where every lower form of being is related to every higher form of being as means to ends. The end of all things is the Glory of God. Such terms seem very far from any considerations of possibility ; but if the literary or religious terminology were eliminated and the intellectual framework left, we should have a teleological interpretation of many parametric systems analytically equivalent to an actual whole. From the methodological point of view we should have a teleological theory paralleling each analytic system which is discovered in our analysis of actuality. This is a commonplace conversion in ordinary everyday thought but its philosophic bearing is not easily seen. I believe it can be made clear in terms of our theory.

$$IW\,F\ [(f_1(x) \,.\, f_2(x) \,.\, f_3(x)\ \ldots\ldots\ f_n(x)]$$

IW = Individual Whole.
F = Variable Whole
$f(x)$ = Parts of Variable Whole.

If we suppose IW to be a value, then F will be purpose, f will be subordinate purpose, and x will be means for the fulfilment of F which is analytically equivalent to IW. Or we may say in reference to Aristotle that:

IW is the final cause of itself.
F is the formal cause.
f is the relation of efficient cause.
x is the material cause.

The symbolism has these alternative interpretations. Are they justified in theory? The answer to this question takes us into metaphysics, but I shall try to keep the methodological point of view throughout.

Parameters by dialectical translation become relations in the metaphysical universe of discourse. A parametric system becomes a relation of relations of relations, etc. When they occur in logic, they are abstract, but in the judgment they are discovered as concrete characters, qualities, patterns, designs, and so forth in the individual whole. They thus appear to be realized possibilities.

Further, abstract relations are external; concrete relations are internal. This will mean that when relations are abstracted, they become external, or when the actual is analysed, external relations are discovered which are analytically equivalent to the concrete relations which are internal. That a given relation is internal will mean that it is concrete in an actual whole; its character depends on the whole of which it is a constituent. That a given relation is external will mean that it is an abstract relation in a variable whole, and may maintain its character independent of any such whole. This is the metaphysical condition which underlies the distinction we have made between individual and variable whole, between actuality and possibility. It is the necessary condition for abstract thought, that is the isolation and manipulation of single parameters which we call reasoning.

Now these distinctions are relevant to the teleological interpretation of possibility.

$$IW\ F\ [(f_1(x) . f_2(x) . f_3(x) \ldots\ldots f_n(x)]$$

may be written $IW\ R\ [(R_1\ abc) . (R_2\ xyz) \ldots . (R_n\ mno)]$ We may substitute relations for functions. It will then be seen that $R, R_1\ R_2 \ldots R_n$ may be equivalents of concrete relations holding within *IW*. If there are such relations, they are internal, and as such are values organized as means and ends. If they are abstracted they become external and are spoken of as purposes or parameters indifferently.

If this is a correct interpretation of these formulae, it seems that teleology is a valid interpretation of any explanation or analysis, but is in no way an addition to any other valid interpretation except in verbal form. Logically or analytically, there is no difference between purposive and non-purposive explanation.

The current controversy over this problem rests on a fundamental misconception that purpose is somehow an alternative or addition to mechanical or methematical analysis. Vitalism rests its case on the evidence of incompleteness and inadequacy of this or that mechanical explanation, and proposes the preferable alternative of entelechy or vital force. Mechanists accuse vitalists of bringing occult entities, unobserved processes, and undefined conceptions to cover up incomplete analysis and to take the place of it. Both of these are futile arguments based on uncriticized and misconceived premises, if I am correct.

Again certain phenomena are classed as physical or material, and certain others as vital or mental, and we have what is called the bifurcation of nature. On our analysis this bifurcation is based on one of two premises. Either the distinction is between two types of explanation supposed to be different, purposive and non-purposive; in that case the distinction is not genuine, since any explanation, if it is explicit, will be both purposive and non-purposive. Or, the distinction is between two parametric systems. One system has a king parameter with an identity condition and field of variability which is called life or mind, and the other has no such parameter. The issue in this case must wait for its solution to come from further observation and analytical elaboration. The common trouble is that the parameters are not clearly defined and the controversy is merely verbal. One could learn some methods of refining the parameters which are involved in this field from the mediaevals. The issues at present are more dialectical than scientific.

The most regrettable definitions of purposes are those based on the assumption that only minds have purposes. They probably derive their popularity from the design argument in natural theology, where the purposiveness of nature, as it was called, was evidence of an intelligent creator. One comment is enough for that: Intelligent minds may discover purposes, even their own, but it is arrogance to suppose that only they are capable of having purposes. Any individual that is analysable has a purpose, in fact has many purposes, and they are identical with the laws it obeys, or more strictly, with the theories that explain its behaviour.

But the objections to purposive explanation are well made, or would be if they were more discriminating. Spinoza's argument on final causes, mentioned above, is a case of discriminating objection. Given any set of coordinate parameters, symbolized by variables of the same degree of variability under a common identity condition, the parameter represented by the function of these variables is the purpose but it obviously cannot be substituted for any of them, nor can the individual whose analysis these parameters represent be substituted for them. Final and formal causes should not be confused with efficient and material causes. For instance, if 'instinct' is a parameter analytically equivalent to a given concrete act, it is not a substitute or rival term for neurological terms which may be proposed. With respect to the latter instinct is a form, and they are its content. Neither should neurological terms be exclusive of higher forms such as instinct or will. Neglect of such distinctions in parametric order opens the way for all sorts of confusion in contemporary science. They give rise to the 'nothing but' kind of argument and the corresponding recriminations from the other side. Dialectic is sorely needed in such cases.

A similar confusion is the origin of the tradition of dynamism in ethics. This tradition traces itself back to Aristotle's *Ethics*, which was a sober application of physics to human conduct. The confusion has occurred since his time, in fact recently in the idealistic development of potentiality.

Aristotle said that the end of human action was happiness, and he was careful to say that happiness was a general rather than an abstract term. This means that observed cases of goodness also have the character of giving happiness; we should undoubtedly say value. His ethics is the account of how such happiness comes about, and it is given in terms of capacities, or human potentialities being realized. Happiness is realized possibilities, we are told by his modern descendants. But the context is from here on different, and the general theory in consequence takes on a quite surprising character. Where Aristotle was analysing human conduct, they are legislating its ideals.

The translation of the formula is made by a simple harmless looking proposition: What can be, ought to be. If one has a capacity, it ought to be developed; each capacity ought to be developed; all capacities ought to be developed. What, then, are human capacities or potentialities? Aristotle discovered particular capacities by analysing cases of human action. The idealist, on the other hand, becomes speculative and goes in romantic search for possibilities. He finds that they are the sum total of what may happen. Since each of these has some conceivable relation to every other, they make a system in human thought. They are, therefore, human possibilities. If we apply the formula, what can be, ought to be, the conclusion is that man's duty is to realize all these possibilities and they are infinite. Man is potentially the universe, and it does not yet appear what he shall be. If this is not true of his empirical self, it is true of his transcendental ego. This is, to say the least, an ambitious ideal, but not too great for a romantic hero or a genius.

To be fair, I admit this is a rather bald and extreme statement of the theory, but it is no more than is claimed by implication in current theories of meliorism and progress. On my view it is fairly easy to criticize.

The theory gets its start from the fact that a given individual whole has an indefinite number of alternative analyses. Each analytic system is founded on a specific base of analysis which has at least one contrary. Hence, any systematic integration of a known class of systems will be subsumed under a parameter which has in its turn its contraries. Possibility is radically pluralistic and apparently indefinitely extensible. This means that any given individual whole has infinite possibilities. If my analysis of the judgment is correct, this is true; but it is no more significant than saying that a given whole is infinitely divisible, or that the number of variable wholes analytically equivalent to it is limited only by imagination and technical ingenuity.

The idealist has made a verbal transition from this to the doubtful, if not self-contradictory notion of a system of all systems, or the class of all classes, which I have called absolute possibility. The shift from empirical to transcendental ego is evidence of the recognition of this, but it is not an evidence of clear thinking. The contradictions and amphibolies involved in integrating systems are glossed over and romantic intent arrives safely at the absolute. Finally the application of the categorical imperative in this context, magnifying the ideal and belittling the difficulties, leads to a faith in the immortality of the soul, an infinite time in which contradictions may be dissolved in dialectic and all possibilities may be realized.

Less ambitious attempts to apply possibility in this way qualify the ideal without denying it. For instance, the Freudian metapsychology postulates the subconscious as a high pressure reservoir of instinctive potencies. These instincts are distinguished and classified and finally they are all subordinated to two super-instincts, the life instinct and the death instinct. Human action is the realization of these two rival and irreconcilable potentialities. There is always a conflict or tension between them, and any given action becomes a resultant of forces in a locus whose formula is the greatest possible activity in terms of instinctive urges with the least possible restraint. The radical pluralism of possibility is here recognized, but the locus is still the idealistic ideal of full realization of all possibilities, though it is rather war-worn and docile. The development of personality is to be guided by this ideal. Again the search begins for capacities, this time within psychology which has been substituted for metaphysics. The result is a composite picture of the healthy-minded man, and we have the ethics of normality.

If the parametric system represented by psycho-analytic theory were fully elaborated, each bit of human behaviour would be explained or analysed in terms of complexes, which would be terms in the expansion of the life and death formula of the Freudian metapsychology. With proper observational data and logical restraint this would parallel Aristotle's doctrine of the Golden Mean, the resultant of the vices at the extremes of virtue. But at present the lacunae in the data and the temptation of 'psycho-analogy' leads the psychologist back into the idealistic school of rhetoric and we have our cults of psycho-analytic ethics.

The analysis of possibility that I have made allows us in no uncertain terms to criticize and limit the sort of teleology to which this sort of dynamism leads. This analysis says that possibility is the measure of actuality and has a parametric structure. This means that the conversion of possibilities into formal causes, of ideas into ideals, is valid only in a judgment which analyses a given individual whole. Otherwise it is myth and romance. This is relevant to the application of any science, biology, medicine, psychology, or astrology, to human conduct. It also applies to having ideals or plans of future action, hence to programs of social uplift, as well as to metaphysical and theological systems of ethics. Also, the requirements of parametric analysis must be met. They are (1) the parameters (whether potentialities, capacities, or ideals) must be unambiguously defined, and (2) the limits of their variability, hence their application and extension, must not be violated. Purposive explanation and dynamism will then have no more dangers than any other of equal rigor.

SPENGLER, THE SPENGLERITES, AND SPENGLERISM

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[The popular curiosity about the work of Spengler suggests that the following articles may serve a useful purpose in orienting those who have only encountered eulogies or brief dismissals of his system. The first deals critically with its historical and philosophical claims; the second considers the social setting in which the book made its appearance in Germany.—Ed.]

Last winter there was published in London and New York a book entitled *Civilization or Civilizations*, and subtitled by its authors " An Essay on the Spenglerian Philosophy of History". Dr. F. C. S. Schiller wrote an Introduction to the book, in which he concluded that "English readers may confidently be recommended to embark on the exploration of the Spenglerian philosophy of history under the able guidance of Mr. Goddard and Mr. Gibbons".

The volume, I trust, has long since been received in the infernal circle that Dante should have apportioned for books that " sin against reason ". On its own account it is worth little attention, and certainly no serious criticism. But it does perform a rare service in relation to its intellectual source, the first volume of *The Decline of the West* by Oswald Spengler (London: Allen and Unwin; New York: Knopf; 1926), an authorized translation with notes by Charles Francis Atkinson. It furnishes concrete exemplification of what happens when an elaborate and grandiloquently presented doctrine, such as Spengler's, is restated, denuded of its intricacy for popularization. In this example one can see the archetype of the relation between the author of any " great original idea " that has imaginative power and the cult of his disciples. It is with such cults of followers and interpreters in mind that one becomes almost captiously critical of an Ouspensky or a Keyserling or a Spengler. And not without justice! For while Spengler is vastly superior in the dignity and variety of his presentation, and in the impressive extent of his scholarship, to all the salon conversation and all the proselytizing commentary he has generated, the crudely jointed skeleton of ideas that can be so readily discerned in the thread-bare patchwork of the Goddard and Gibbons version is, nevertheless, the same structure that Spengler himself drapes more skilfully.

Narcotic immersion under the flow of heavy words which sometimes becomes a torrent of encyclopaedic references, may have prevented the reader of *The Decline of the West* from appreciating too clearly the structural schema of the Spenglerian philosophy of history. The reader was probably too occupied with considering —perhaps weighing—the myriad analogies, pronouncing,—perhaps remembering,—the strange names of unfamiliar persons and places, and acquiring the technical vocabulary used to salute the *world-as-history*, to be equally considerate of the logical phases of the mere argument: its assumptions, its procedure step by step, and its criteria of demonstration. But all this is readily discoverable in the formulation of Spenglerism by his disciples, and upon inspection of such a tract as *Civilization or Civilizations*, a set of simple rules can be stated which form the prescription for construing the history of any possible world *a la Splengler.*

(1) From an observation of the historical past, derive a few sweeping generalizations concerning the succession of epochs in any civilization.

(2) Define these epochs in hard and fast terms so that such phrases as "empire period", "stage of feudalism," "nineteenth century" and "decadence" must always mean the same whenever and wherever applied.

(3) Analyze out of the sum of all historical records nine distinct civilizations (Spengler treats only six), and keep them separate and distinct even though they overlap geographically and ethnologically, and are causally interdependent.

(4) So date the rise and fall of these civilizations that each of them lasts the mystic length of 1600 years, divisible properly into nine important epochs, each adamantly defined according to Rule 2. Thus, for instance, every one of these civilizations must have a "nineteenth century" which always occurs 300 years before the final dissolution of that civilization, and which always accompanies the rise of the "bourgeoisie", so defined that it means the same in China and Arabia as in Europe.

(5) Then construct a chart in which are exhibited the parallel phases of the nine civilizations in each of the nine epochs with regard to form of government, type of thought, and kind of art. This is a sort of comparative cultural graph, easily made if the terms are chosen arbitrarily enough, and if enough facts are ignored.

(6) One thing more is required before the great law can be derived. It is necessary to discover, or invent, the " general idea " or " form principle " of each civilization, and to hypostatize this intuitively-apprehended principle by affixing to it an impressive name. Thus the general idea of Mesopotamian culture is called " Arabian ;" or " Magian " ; of the Greek, " Apollinian " ; of Western Europe, " Faustian ". Each of these general names signifies extremely definite characteristics so that when a certain group of traits peculiar to one of these civilizations occurs within the borders of another civilization, it is called a " Magian " event, even though it takes place in Rome or Pergamum. A subsidiary rule (6A) is necessary and relevant here, the rule of " pseudomorphosis " which allows you to insist that the development of one culture can be masked by the superimposition of another, and thus enables you to deal with many more recalcitrant and obstinately uncongenial facts than you could have otherwise handled.

(7) Finally, one pronounces on all history so articulated and set forth, the " law of civilization ". All civilizations pass through the same orbit of growth and decline, and in every respect their careers present concrete cultural analogies which make possible the prediction of the future, as well as the historical imagination of what the unknown past must have been. " Spengler's law of civilization bestows on us, if only we understand it rightly, the power of prophecy in history. Once it is grasped in its essence, we may trace in the details ourselves and find in the past, dark and fragmentary as it may appear, many of the factors without which any civilization would be incomplete. We can argue that the future, dark and conjectural though it is, may be expected to repeat certain features, invariably exhibited by the civilizations of which we can survey the total history ". And, of course, the crucial point is that, according to this law, Western Civilization is at the margin of its decadence.

The actual facts do not really matter. The *a posteriori* historical generalizations having been inverted unconsciously into absolute *a priori* regulative principles of historical change, they can no longer be seriously contradicted by other empirical facts which had been previously ignored. For instance, the adduction of diverse causes of the Renaissance is irrelevant, for " the Renaissance would have occurred even if there had been no Greece, even if Athens had as little influence on Europe as on Peking." The law of civilization holds entirely, not only contrary to fact, but even where there are no facts to support any inferences whatsoever. In many instances, it is admitted that there is no evidence for all of the civilizations being compared with respect to a certain phase of development, and yet the law holds for each and all of them, *because* it is not derived from the facts but imposed upon them.

Of course, there are facts and facts; and the argument seems to depend for its cogency upon the dogmatic statement of at least two questionable "facts" to a page. Here and there brave, omniscient gestures supplement the factual fictions, such statements as the following in a tone of assurance that defies challenge: "At the beginning of the eighteenth century, religion and accepted beliefs fall into a state of decay, and are despised by the more advanced philosophical thinkers; but philosophy itself, as well as science, leads to blank negation". Exceptions to any of these generalizations are summarily dismissed as follows: "Once we have grasped how art develops and what is the fundamental symbol of Europe, we can work out the whole details for ourselves; there are necessarily some apparent exceptions and contradictions, but further examination will find that they are either unimportant or the result of momentary distortion." A perfect immunization against criticism!

The last and most important phase of the technique is the drawing of manifold cultural analogies, such as between Roman stoics Confucians, and European Socialists; between Greek music and the "Marche Militaire"; between Pythagoras, Mohammed and Cromwell, and so forth. If you rise up to deny the meaning or validity of any of the innumerable analogies of the same ilk, the Spenglerites warn you that you are falling into "the traps of the false analogies which have deceived critics of art"—who have not been properly indoctrinated. Mr. Goddard and Mr. Gibbons should be warned that the making of analogies is like living in glass houses, and only he who is without them should throw the first stone.

Lest it be objected, on the one hand, that this is unfair parody, or on the other, that the satire may be relevant to the pronouncements of the like of Goddard and Gibbons, but not to Spengler himself, I have made a collection of paragraphs and sentences from both books. They are hereby appended, first a set of curios from Goddard and Gibbons, and then a gallery of exhibition pieces from Spengler.

I do not assert that these quatotions prove anything whatsoever; but I do offer that an examination of these carefully selected and assorted specimens,—and of the many more that have been left *in situ* on the hundreds of pages still intact,—will certainly provide the exemplary material and the authentic manner to guide any one who wishes to construct a history according to the plans submitted. There is, furthermore, much enlightenment to be gathered from the contrast between Spengler and his disciples, when placed in such unholy proximity. The sacred becomes infected with the profane, and those who in their first reading held Spengler sacrosanct may now be forced to rub their eyes.

Finally, I do not claim that each of these paragraphs or citations contains some *schrecklichkeit* of scholarship, or some patent absurdity, or some unabashed dogmatism. Most of them do, of course, but I shall not assert it; for what I do claim, and report, is merely that in each of these pieces there is at least a smile, though sometimes a sad one!

Despite the recent work of Ellsworth Huntingdon—

> " Buckle's ideas on civilization have long been discarded. Climatic and other environmental conditions will not account for much in the activities of mankind." (G-G, 51).

Despite the fact that Heraclitus talks of " the upward and the downward paths ", and Parmenides wrote a poem concerning the three ways of life—

> " Like ourselves the Greek looked for no law and no way, in the manner of the Indian. Such laws as he discovered were the result of his critical intelligence working on the facts of the world." (G-G, 59).

Despite the " fact " that Plato does " escape from the concrete " at times—

> " Typical of the Greek is his achievement in geometry, which of all sciences is that which can be called concrete, limited and yet beautiful. To sum up the Greek " idea " is impossible, yet the words " concrete beauty " as the ideal, and " concrete form " as the average Greek feeling are not far from the truth. If Plato can escape from the concrete at times, the average man was nearer to Aristotle's Politics than to Plato's Republic. (G-G, 60).

The " form principle " of the Classical is concreteness, and yet we find—

> " Heraclitus was similarly impressed by fire and built up a theory of the Logos which no one has understood." (G-G, 90). " The Greek throughout his culture preferred abstract thought, even though it was living, to the study of concrete facts. From this aspect, Western Europe is infinitely superior to the others. The European is willing to leave philosophy to others while he investigates the fact." (G-G, 92). *But* " Western Europe refuses to be concrete with the Greek or magical and definite with the Arabian (i.e., the Magian); it has no boundaries to its science or to its thought except those which are placed by nature or by its intellectual capacity. . . . Beyond the concrete and the algebraic x it passes to conceptions so intellectually absurd as $\sqrt{-1}$." (G-G, 65). *And still*—" In a more practical aspect the fundamental idea of Western culture may be said to be the search after truth. This is, in a sense, a particularly Greek quality. Greek thought was daring in its absence of restriction and magnificent in some of its conclusions, but in the search for truth it exhibited one great fault—it neglected facts. Ionian and Eleatic philosophy seized on some natural phenomenon which it observed, and instead of investigating its nature proceeded to deduce from its supposed characteristics a theory of the whole universe . . . . In fact, the Greek saw in truth a subsidiary form of beauty

> and constructed philosophies much as he constructed statues; that is, on artistic principles, and while his artistic intuitive spirit penetrated far into the dim mysteries of the real and universal, it had no clear conception of what it had to perceive. It saw life whole, but never saw it clear. This is in exact contrast to the Western European." (G-G, 66-67.)

On the other hand, when the Western European is " scholastic " it can be said that—

> " Scholasticism is in fact typical of the efforts of the fettered human mind when it is accidentally faced with great and vitally important problems, and the struggle between the realists and nominalists in Europe is similar to the Trinitarian controversy in the Eastern part of the Roman Empire. The Arabian pseudo-morphosis exhausted its intellect in endless discussions about the Logos and the substances, while the Westerns debated the question of universals. In both cases, however, the result is purely negative and has no meaning for the advance of civilization." (G-G, 79). *And*—" in the end the mediaeval man, though he made God in his own image and expressed in Him his deepest feelings, could not understand God; however much he made God into something like himself, there was still a mystery about Him, and he never felt himself secure without the power of the priest." (G-G, 81).

Despite the statement that " Avicenna in the tenth century is almost as encyclopedic as Aristotle " and despite Averroes, it must be said that—

> " Arabian civilization was by its nature debarred from philosophy in any such form as the Greek." (G-G, 99).

Modern philosophy receives startling exegesis—

> " Descartes' scepticism is parallel to that of some of the sophists —not to that of the Pyrrhonists—but his '*cogito ergo sum*' is a strong assertion of the practical side of Europe. . . . There is far more likeness between Kant and Plato than between Pascal and Protagoras. It is Berkeley with his subjective idealism who parallels Protagoras with his relativism; and Kant, like Aristotle, the last of the great original philosophers, went over the ground so far covered by humanity, and for the last time was able to reach a conclusion which avoided scepticism. For the future, philosophy was either transcendental and mystical, as in the Stoics and Hegelians, or pure philosophic doubt as in the Pyrrhonists and Agnostics." (G-G. 101-102).

In the field of the arts we find, despite the contemporaneity of Pericles, Phidias and the Parthenon, that—

> " In those civilizations where architecture is not the most typical art, i.e., everywhere but Egypt, it reaches its highest form about 200 years before the highest point in politics is attained." (G-G, 113.-114)

And analogies, with implied value-judgments, are easily drawn—

> " Egypt from 1800-1700 B.C., Greece from 500-350 B.C., Arabia from A.D. 700-850 (in Byzantine, Italian and Moorish art), Europe from A.D. 1600-1750, all mark an advance which is quite clearly defined as the height. Fifty years more, and in each case the best is over, and in place of Phidias, Scopas, of Bach, Beethoven; just as we have Alexander in place of Pericles, Louis XVIII in place of Louis XIV, and in place of the greatness of Puritan thought and philosophic originality, the dullness of rationalism and academic hair-splitting. . . . We can discuss Beethoven or Praxiteles much better than Phidias and Bach, less well than Strauss or Pergamene sculptors." (G-G, 123-124). " If Bach may be compared to the Parthenon, the Erechtheion is Beethoven." (G-G, 129). " Though to some of us Phidias appears the finest sculptor in the world, there is little doubt that he had

> not yet reached the summit; that glory must be reserved for Polyclitus or Praxiteles. We are really not able to judge, because sculpture is not the art in which Western Europeans feel the highest satisfaction, and there is bound to be more difference of opinion. But in any case, the series of sculptors, which runs from Alcamenes to Lysippus, corresponds to the series of great musicians which ends with Mozart or perhaps Beethoven. Polyclitus had laid down thc canon, though he dcparted from it himself. Praxitilcs had definitely reached perfection of technique, though sometimes his skill led to weakness as it did with Mozart. Lysippus tried to return to the strict form and tradition, in the same sort of way as Aristotle in philosophy reacted against the comparative weakness of Plato." (G-G, 130-131).

And the nineteenth century, always being the beginning of decadence, it is clear that—

> " There was nothing more to say after the days of Brahms and Wagner; even they are far from the perfection of 100 years earlier. They are nineteenth century. It is in the fugue and in strict counterpoint that Western music finds its most satisfying expression, and all the more rigid forms are developed on those lines, and it is by these means that the musician can get the furthest away from the every-day things. Strictly there is no emotion in Western music, if we accept the word emotion in its ordinary sense. That there is emotion in Bach, everyone must admit who has heard the " Largo of the Concerto " for two violins in D minor; but there is an impassable gulf between that and the emotion of Wagner at his worst. The one is transcendent, the other gross; Bach felt within him the metaphysical urge of the civilization, Wagner always tended to express his petty personal emotions." (G-G, 138).

With an equal degree of humility and intellectual prudence, it may be asserted that—

> " The Romans themselves were everything that the Greeks were not. Their thought was borrowed from Greece and mostly mutilated in the borrowing, so that Stoicism became a cast iron puritanism of 'antique Cato', and Epicureanism a licence for the life of pleasure lived by the 'hogs of Epicurus' stye'." (G-G, 182).

From all of which, and much, much more that is of the same sort, it is concluded that—

> " Everything that can conceivably have any ultimate value is tending to disappear. Everything in connection with truth, beauty and goodness takes a back place, and its position is filled by the desire for pleasure and material prosperity, by the gladitorial displays, and the unrivalled licence and luxury of Rome, and the baseball matches and the millionaire existence of America. Science, art and ideals, are therefore nearing their end." (G-G, 191-192).

If now we turn to the Master himself, we shall find a certain dignity of style and elevation of manner, but withal the same extraordinary power of generalization. For instance—

> " It was not the Latin, but the German peoples of the West and America who developed out of the steam engine a big industry that transformed the face of the land. The relation of these phenomena to Stoicism and to Socialism is unmistakalbe. Not till the Roman Caesarism—foreshadowed by C. Flaminius, shaped first by Marius, handled by strong-minded, large scale men of fact—did the Classical World learn the *pre-eminence of money.* Without this fact neither Caesar not 'Rome' generally, is understandable. In every Greek there is a Don Quixote, in every Roman a Sancho Panza factor, and these factors are dominants." (S, 36).

"Not in entire forgetfulness . . . . but trailing clouds of glory do we come"—

> "In this work . . . . to sketch out this unphilosophical philosophy —the last that West Europe will know. Scepticism is the expression of a pure Civilization; and it dissipates the world-picture of the Culture that has gone before. For us, its success will lie in resolving all the older problems into one, the genetic. . . . The thinkers of the past conceived external actuality as produced by cognition and motivating ethical judgments, but to the thought of the future they are above all *expressions and symbols. The Morphology of world-history becomes inevitably a universal symbolism.*" (S, 45-46).

Which is followed by a confession that should help the reader to evaluate much that follows, especially Spengler's appreciation of Aristotle and Plato.

> "The philosophy of this book I owe to the philosophy of Goethe, which is practically unknown to-day, and also (but in far less degree) to that of Nietzsche. The position of Goethe in West-European metaphysics is still not understood in the least . . . . nevertheless he was a philosopher. His place *vis-à-vis* Kant is the same as that of Plato—who similarly eludes the would-be-systematizer—*vis-à-vis* Aristotle. Plato and Goethe stand for the philosophy of Becoming, Aristotle and Kant for the philosophy of Being." (S, 49, footnote).

Attention of psychologists is called to the relation between the mathematical instinct and the instinct for ceremonials.

> "The Australian natives, who rank intellectually as thorough primitives, possess a mathematical instinct (or, what comes to the same thing, a power of thinking in numbers which is not yet communicable by signs or words) that as regards the interpretation of pure space is far superior to that of the Greeks. Their discovery of the boomerang can only be attributed to their having a sure feeling for numbers of the class that we should refer to the higher geometry. *Accordingly* —we shall justify the adverb later—they possess an extraordinarily complicated ceremonial and, for expressing degrees of affinity, such fine shades of language as not even the higher Cultures themselves can show. There is analogy, again, between the Euclidean mathematic and the absence, in the Greek of the mature Periclean age, of any feeling for ceremonial public life or for loneliness, while the Baroque, differing sharply from the Classical, presents us with a mathematic of spatial analysis, a court of Versailles, and a state system resting on dynastic relations." (S, 58).

With sudden relief we discover that the long sought secret of Plato's "doctrine of Ideas" is a repressed Oedipus complex.

> "Stiff forms are the negation of life, formulae and laws spread rigidity over the face of nature, numbers make dead—and the "Mothers" of Faust II sit enthroned, majestic and withdrawn . . . Goethe draws very near to Plato in this divination of one of the final secrets. For his unapproachable Mothers are Plato's Ideas—the possibilities of a spirituality, the unborn forms to be realized as active and purposed Culture, as art, thought, polity and religion, in a world ordered and determined by that spirituality." (S, 70).

Although we have no knowledge of the method of research of the Greek Atomists, it can be concluded nevertheless that

> "The existence of the Classical soul is the *condition* for the appearance of Democritus's method, the existence of the Faustian soul for that of Newton's." (S, 119).

The distinction between the Classical and the Faustian Destiny-Idea conditions similarly the difference between Shakespeare and Sophocles.

> " Lear is at the last a mere name, the axis of something unbounded. This conception of destiny is the " infinitesimal ' conception. It stretches out into infinite time and infinite space. It touches the bodily, Euclidean existence not at all, but affects only the soul. Consider the mad King between the fool and outcast in the storm on the heath, and then look at the Laocoon group ; the first is the Faustian the other the Apollinian way of suffering. Sophocles, too, wrote a Laocoon drama, and we may be certain that there was nothing of *pure soul-agony* in it." (S, 129).

It is the form of the soul, and not a knowledge of mechanics, and a power over materials that determines architectural change, for—

> " The Magian and the Faustian souls, on the contrary, built high. Their dream images became concrete as vaultings above significant inner spaces, structural anticipations respectively of the mathematic of algebra and that of analysis. In the style that radiated from Burgundy and Flanders rib-vaulting with its lunettes and flying buttresses emancipated the contained space from the sense-appreciable surface bounding it . . . . When windows were in practise indispensable, they were for the sake of artistic impression concealed by galleries as in the Eastern basillica. The *window as architecture*, on the other hand, is peculiar to the Faustian soul and the most significant symbol of its depth-experience." (S, 199).

The symbol of the Euclidean (i.e. Classical) soul, furthermore determined the choice of colours in Greek decoration.

> " Blue and green are the colours of the heavens, the sea, the fruitful plain, the shadow of the Southern noon, the evening, the remote mountains. They are essentially atmospheric and not substantial colours. They are *cold*, they disembody, and they evoke impressions of expanse and distance and boundlessness. For this reason they were kept out of the frescoes of Polygnotus. And for this reason also, an ' infinitesimal ' blue-green is the space-creating element throughout the history of our perspective oil-painting, from the Venetians right down to the 19th century ; it is the basic and supremely important tone which supports the ensemble of the intended colour-effect, as the *basso-continuo* supports the orchestra. . . . . The most significant use of dusky green as the colour of destiny is Grünewald's. The indescribable power of space in his *nights* is equalled only by Rembrandt's. And the thought suggests itself here, is it possible to say that his bluish-green, the colour in which the interior of a great cathedral is so often clothed, is the specifically *Catholic* colour ? —it being understood that we mean by ' Catholic ' strictly the Faustian Christianity . . . . (S, 245, 246-247).

Colour has been more significant in symbolizing civilizations and souls than is generally suspected.

> " Brown then became the characteristic colour of the *soul*, and more particularly of a historically-disposed soul. Nietzsche has, I think, spoken somewhere of the " brown " music of Bizet, but the adjective is far more appropriate to the music which Beethoven wrote for strings and to the orchestration that even as late as Bruckner so often fills space with a browny-golden expanse of tone. All other colours are relegated to ancillary functions—thus the bright yellow and the vermilion of Vermeer intrude with the spatial almost as though from another world, and with an emphasis that is truly metaphysical, and the yellow-green and blood-red lights of Rembrandt seem at most to play with the symbolism of space." (S, 252-3).

But colour no more than ruins—

> " Nothing was further from the Classical mind than this reverence for the weather-beaten evidences of a once and a formerly. It cleared out of sight everything that did not speak of the present; never was the old preserved because it was old. . . . Their action was quite in keeping with the style of a culture that raised cremation to the rank of a major symbol and refused with scorn to bind daily life to chronology. *Our* choice has usually been the opposite. The heroic landscape of the Claude Lorrain type is inconceivable without ruins. The English park with its atmospheric suggestion, which supplanted the French about 1750 and abandoned the perspective idea of the latter in favour of the " Nature " of Addison, Pope and sensibility, introduced into its stock of motives the most astonishing *bizarrerie* ever perpetuated, the *artificial ruin* in order to deepen the historical character in the presented landscape."(S, 254).

And now, in some degree, a summary—

> " The opposition of Appollinian and Faustian ideals of Humanity may now be stated concisely. Art and Portrait are to one another as body and space, instant and history, foreground and background, Euclidean and analytical number, proportion and relation. The Statue is rooted in the ground, Music (and the Western portrait *is* music, soul-woven of colour tones) invades and pervadcs space without limit. The fresco-painting is tied to the wall, trained on it, but the oil-painting, the " picture " on canvas or board or other table, is free from limitations of place. The Apollinian form language reveals only the become, the Faustian shows above all a becoming." (S, 266).

No wonder then that in a Faustian civilization such as this, Mariolatry occurred and also Mother's Day !—

> " Endless Becoming is comprehended in the idea of *Motherhood*, Woman as Mother *is* Time, *is* Destiny. Just as the mysterious act of depth-experience fashions, out of sensation, extension and world, so through motherhood the bodily man is made an individual member of this world, in which thereupon he *has* a Destiny. All symbols of Time and Distance are symbols of maternity. *Care* is the root-feeling of future, and all care is motherly." (S,267).

But becoming is not forever fruitful for—

> " The bitter conclusion is that it is all irretrievably over with the arts of form of the West. The crisis of the 19th century was the death-struggle. Like the Apollinian, the Egyptian, and every other, the Faustian art dies of senility, having actualized its inward possibilities and fulfilled its mission within the course of its Culture. What is practised as art to-day—be it music after Wagner or painting after Cezanne, Leibl or Menzel—is impotence and falsehood." (S, 293).

Students of Spinoza will be interested to learn that the soul of their philosopher really represents in itself a pseudo-morphosis—

> " Child of the Ghetto, he is, with his contemporary Schirazi, the last belated representative of the Magian, a stranger in the form-world of the Faustian feeling. As a prudent pupil of the Baroque he contrived to clothe his system in the colours of Western thought, but at bottom he stands entirely under the aspect of the Arabian dualism of two soul-substances. *And this is the true and inward reason why he lacked the force-concept of Galileo and Descartes.* This concept is the centre of gravity of a dynamic universe, and *ipso facto* is alien to the Magian world-feeling. There is no link between the idea of the Philosopher's Stone (which is implicit in Spinoza's ideas of Deity as *causa sui*) and the causal necessity of *our* Nature-picture. Consequently his determinism is precisely that which the orthodox wisdom of Baghdad had maintained —" Kismet ". It was there that the home of the *more geometrico* method was to be looked for—it is common to the Talmud, the Zend Avesta and the Arabian Kalaam ; but its appearance in Spinoza's " Ethics " is a grotesque freak in *our* philosophy." (S, 307).

But this is no more startling that what can be learned about Descartes in his relation to the Faustian soul-form.

> "It is common ground for Descartes and Parmenidies that thinking and being, i.e. imagined and extended, are identical. "*Cogito, ergo sum*" is simply the formulation of the depth-experience—I cognize and therefore I am in space. But in the style of this cognizing and therefore of the cognition product, the prime-symbol of the particular Culture comes into play. The perfect extension of the Classical consciousness is one of sensuous and bodily presence." (S, 387).

Probably, it was the Egoism of the Faustian soul, as well as its characteristic depth-experience, which prompted Descartes to say "I" think, for—

> "To call the Faustian culture a *Will-Culture* is only another way of expressing the eminently historical disposition of its soul. Our first-person idiom, our "ego habeo factum"—our dynamic syntax, that is, faithfully renders the "way of doing things" that results from this disposition and, with its positive directional energy, dominates not only our picture of the World-as-History but our own history to boot. This first person towers up in Gothic architecture; the spire is an "I," the flying buttress is an "I". And therefore, the *entire Faustian ethic* from Thomas Aquinas to Kant *is an "excelsior"*—fulfilment of an "I", ethical work upon an "I", justification of an "I" by faith and works; respect of the neighbour "Thou" for the sake of one's "I", and its happiness; and lastly and supremely, immortality of the "I." (S, 309).

Despite the appellation of Heraclitus as "the Dark"—

> "Every high creator in Western history had in reality aimed, from first to last, at something which only the few could comprehend. . . . . Think of Giordan Bruno, or Leibniz or Kant, as against Anaximander, Heraclitus, or Protagoras. What does it mean, that no German philosopher worth mentioning can be understood by the man in the street, and that the combination of simplicity with majesty that is Homer's is simply not to be found in any Western language. . . . . On the contrary every Attic burgher belonged to the Attic Culture, which excluded nobody; and consequently the distinctions of deeps and shallows which are so decisively important for us, did not exist at all for it. For us, popular and shallow are synonymous—in art as in science—but for Classical man it was not so." (S, 327-328).

And as a compensation for this breach between the profound and the popular, the Faustian Culture has journalism—

> "Diatribe belongs necessarily to the 'religion of the irreligious', and is the characteristic form that the 'cure of souls' takes therein. It appears as the Indian preaching, the Classical rhetoric and the Western journalism. It appeals not to the best but to the most, and it values its means according to the number of successes obtained by them. It substitutes for the old thoughtfulness an *intellectual male-prostitution* by speech and writing, which fills and dominates the halls and market-places of the megalopolis. As the whole of Hellenistic philosophy is rhetorical, so the social-ethic system of Zola's novel and Ibsen's drama is journalistic." (S, 360).

And as the journalism grows yellow and sere, we reach an end—

> "The great century of the Classical science was the third, after the death of Aristotle; when Archimedes died, and the Romans came, it was already almost at its end. Our great century has been the 19th. Savants of the calibre of Gauss and Humboldt and Helmholtz were already no more by 1900. In physics as in chemistry, in biology as in mathematics, the great masters are dead, and we are now experiencing the *decrescendo* of brilliant gleaners who arrange, collect, and finish-off

like the Alexandrian scholars of the Roman age. Everything that does not belong to the matter-of-fact side of life—to politics, techniques or economics—exhibits the common symptom. After Lysippus no great sculptor, no artist as man-of-destiny, appears, and after the Impressionists no painter, and after Wagner no musician. The age of Caesarism needed neither art nor philosophy. To Eratosthenes and Archimedes, true creators, succeed Posidonius and Pliny, collectors of taste, and finally Ptolemy and Galen, mere copyists. And, just as oil painting and instrumental music ran through their possibilities in a few centuries, so also dynamics, which began to bud about 1600, is to-day in the grip of decay." . . . .

" But before the curtain falls, there is one more task for the historical Faustian spirit, a task not yet specified, hitherto not even imagined possible. There has still to be written a *morphology of the exact sciences*, which shall discover how all laws concepts and theories inwardly hang together as forms and what they have meant as such in the life course of the Faustian Culture. . . . The uniting of the several scientific aspects into one will bear all the marks of the great art of counterpoint. *An infinitesimal music of the boundless world-space*—that is the deep unresting longing of this soul, as the orderly, statuesque and Euclidean Cosmos was the satisfaction of the Classical. That—formulated by a logical necessity of Faustian reason as a dynamic-imperative causality then developed into a dictatorial, hard-working, world-transforming science—is the grand legacy of the Faustian soul to the souls of Cultures yet to be, a bequest of immensely transcendent forms that the heirs will possibly ignore. And then, weary after its striving, the Western science returns to its spiritual home." (S, 424-425, 427-428).

Fiat !

THUS SPAKE SPENGLER

BY HEINRICH KLUVER, PH.D.

Yesterday Spengler was unknown. To-day his publishers are advertising not Spengler's book, not even a criticism of his book, but a criticism of his critics. We read that *The Dispute about Spengler: A Critique of His Critics* is "an indispensable handbook of German and foreign literature up to date, a document of the greatest significance for the thought of our time"; and we see that M. Schroeter's index of the critics' names contains about 400 entries. It has been pointed out that this book is one-third as large as the first volume of Spengler's *The Decline of the West* itself. Furthermore, we notice that outstanding men of learning have considered it their scientific duty to cooperate in rejecting the Spenglerian theses, and to publish the results of their combined efforts in a special number of the *Logos* (in vol. IX: Joel, Schwartz, Spiegelberg, Curtius, Frank, Mezger, and Becking *contra* Spengler). How is this spectacular celebrity, attained as it were overnight, to be accounted for?

First the effect itself, and here figures may speak. Spengler, a former teacher of mathematics in Hamburg, had at the outbreak of the war completed a book the title of which he had already determined in 1912: *The Decline of the West*. During the war it was worked through again, and before the revolution in 1918 there appeared this book, called in the introduction, "the philosophy of our time". A small pamphlet *Prussianism and Socialism*, which came out in 1919, soon showed on its title-page "56-65 thousandth". A small essay *Pessimism* followed. In the fall of 1922, the long-awaited second volume of the *Untergang* came out. In the meantime the first part had been revised and gone through some thirty editions. In the English edition we are informed that the market has justified the printing of 90,000 copies, though a much lower estimate would seem more likely.

Figures, however, do not suffice for the portrayal of the effect of this work, described on the one hand as demonic, satanic, cold, and impertinent, on the other hand as brilliant and representative of the time. From secluded aesthetes to business men, from journalists to coin-collectors, from mathematicians to theologians, it drew all in its path. Whence this effect? An exhaustive answer to this question—if such can be given—would solve more than one historical and social-psychological puzzle. We must consider separately the person or the work which exerts such an influence, and the time and society on which the influence is exerted. Spengler and his time! Spengler and the people of 1914-1918! A people in which the scientific-technical mind played a dominant role; at the same time, a people with an extremely differentiated feeling-life, often hypersensitive, with modern individualities, moods, and styles; a humanity which had come out of a world catastrophe; a public with which belief in religion had been replaced by belief in the press. And even this faith had received a sharp blow! People sought after gods worthy of belief, and suddenly found everywhere a book, on the white cover in black, deep black letters, *The Decline of the West*. That was in 1918. In December 1922, Spengler could write retrospectively: " In the Introduction to the 1918 edition . . . . I stated my conviction that an idea had now been irrefutably formulated which no one would oppose, once the idea had been put into words. I ought to have said: once that idea had been understood." People read *The Decline* and *understood*: yes, this is decline . . . . Germany 1918!

I shall now turn to the factors which are responsible for the giant success of the book. In the consideration of these factors there will perhaps be gained a better view of the work than any specific presentation of its contents would give.

There is in the first place that Byronism, that decadence *Stimmung* which is likely to appear in history after great wars. It seemed clear even to the dullest brain that the time was a time of collapse. It was not only that crowns and constitutions were relegated *ad acta*, but even the firm foundations of morality seemed to be shattered. Riots, street-revolutions, and the murder of politicians proved satisfactorily to many that now " the spirit, which ever denies " raged in the world. Without God and King, one had to face a heap of demolished cannons and bad war literature. Then, suddenly someone announced in brilliant words: Not alone the façades of our culture have caved in; the whole proud building will in a short time fall together. You may think that the façade alone is shattered; but I preach to you the completion, the downfall of the eighth great culture, which has bloomed on this planet. Thus spake Spengler . . . . and every one bought his book.

But for keener eyes there were revealed other perspectives. What could a military collapse mean for them in a matter of the highest cultural and philosophical importance? For them the interlude of a world war was no reason for believing in the finale of the occidental symphony. Nevertheless Spengler had also spoken truth for them. In these circles people had gradually lost the Darwinian belief in evolution; they had become deaf to the eternal-progress melodies; they no longer saw a *crescendo* in the development from apes to super-man. The episode of the world war was of important symptomatic significance for these people; it was one among many other symptoms. Now came the prophet of downfall! "It is only a matter of pursuing, in the stages not yet completed, the fate of a culture, and indeed of the only one which to-day on this planet is in the process of completion." (For Spengler every culture runs a complete and biologically determined course from efflorescence to death.) All 'decadence philosophers' assented in chorus. How it worked, this objective coldness: "in the not yet completed stages . . . ."

It is characteristic of modern science to measure and to count wherever it is possible; even in the deepest layers of the intellectual life we find this strong urge to quantification. Number has become one of our most important instruments. Indeed, only those sciences are regarded as 'exact' the results of which permit of quantitive formulation. There are certain spheres, however, whose nature cannot be exhausted by means of mathematical formulae. The irrationality of historical life can never be grasped in such a way—who dares to approach phenomena like Napoleon and Jesus with numbers and measures? Yet here comes Spengler with his pessimistic mechanics of history! "In this book is attempted for the first time the venture of predetermining history." This is the proud initial word. It is a matter of calculating ahead in history. Large tables, on which the simultaneous epochs of the different cultures are arranged, accompany the text. Must we not feel the modern spirit in this man who wanted to master the whole of life through number and law; who shows so great an understanding not only for the "silent mathematics" of the Egyptian pyramid-culture, but also for the mathematicians of all times? Therefore: "We know our history. We shall die with self-consciousness and shall follow all stages of the last dissolution with the keen eye of the experienced physician." Thus spake Spengler . . . .

In addition, the work appealed to another enormously strong tendency, *the longing for synthesis*. A view of the totality of the world is what everyone would like to have. To understand the strength of this subjective need, let us recall that all scientific work is split up into an enormous number of separate disciplines. New sciences, new methods, and new discoveries constantly present themselves; the technologies and the fields of knowledge grow beyond all control. Not even encyclopaedias and collections give us a satisfactory synthesis. In Spengler people saw a brilliant mind which achieved a synthesis more encouraging than the results of the usual routine work. His gaze penetrates into every culture and into every discipline. All civilizations, the Babylonian, the Egyptian, the Indian, the Chinese, the Mexican, the Apollonian, the Arabian, and the Occidental-Faustian world—all these are examined. (Who, in the last decades, could lay claim to being at home in so many worlds?) Every discipline is discussed—from history to physics, from the archaelogy of China to the general theory of relativity, from music and poetry to philosophy and myth. The man with a " physiognomical tact " has no difficulties in interpreting these different cultures and disciplines. Modes of life he shows in their growth, their adolescence, and their decay. Street-pavements, women of the world, joint-stock companies, circus fights, entropy, dramatics, and causality—they all are for him symbols; they belong to the form language of culture, and have blood and life. Here was the man who could give what the youth of Germany cried out for: unity, synthesis! He offered more than any professor could offer, and this was recognized gladly and willingly. " For natural science one is *educated*, for the philosophy of history one is *born*."

Spengler did even more than satisfy the strong subjective need of every modern man to have a vision of the sense and the entirety of the world. Everyone who is engaged in a special science knows how many points of contact his science has with other fields. One cannot, for example, pursue psychology without going into physiology, anatomy, chemistry, physics, mathematics, philosophy, and anthropology. It often happens that two related sciences, independently of each other, arrive at the same fundamental concepts. The border lines between the special sciences disappear. Such objectively proven facts Spengler's synthetic spirit succeeds in grasping; " The special sciences, epistemology, physics, chemistry, mathematics, astronomy, approach each other with increasing rapidity. We are going towards a complete identity of results and with that towards a coalescence of form-worlds. This convergence has not been noticed, because since Kant and even since Leibniz no scholar has mastered the problems of *all* the exact sciences." Let us humbly bow our heads, we who have not mastered " the problems of all exact sciences." All of us then! For what are *we* at best? " We are now experiencing the *decrescendo* of brilliant stragglers, who put in order, collect, and finish-off like the Alexandrian scholars of the Roman age." Thus spake Spengler..

I have been speaking of Spengler's work. Now let me speak of his time. It is a time in which public opinion and the fads and crazes of the day play an enormous role. The enormous influence of triviality (*Vierkandt*) ought not to be forgotten : both leather hats for women and Spengler became ' the style '. The fame curve of this man is typical of our times, in which fashion is power. Consider the soul-structure of modern man : " Instead of a people of form, a people grown up with the earth, a new nomad, a parasite, the large-city dweller, the independent, traditionless, factually-minded man who appears in formlessly fluctuating masses—irreligious, intelligent, barren, with a deep distrust of the soil ; thus an enormous step towards the inorganic, towards the end." The traditionless modern and the vast circulation of Spengler stand in close connection. " It is not a question of whether by birth you are German or Roman, Hellene or Roman, but of whether you are by education large-city dweller or provincial."

The present tendency to extremes and paradoxes has also to be taken into account. Youth especially loves superlatives and hates senile moderation ; both this love and this revulsion are catered to by Spengler. How his sharp critique of the " professor-philosophies of philosophy-professors " must have appealed to young people : " A view at men of such a sort is disgusting. The soft insignificance of such people ! It is truly a miserable life-content. to formulate the views about the concept of the will and psycho-physical parallelism once more and little differently than a hundred predecessors have done." And the art of to-day ? " Among engineers of any first-rate factory there is more intelligence, taste, character, and ability than in the whole music and painting of present-day Europe. One thing is quite certain, that to-day every single art-school could be closed without art being affected in the slightest." How must this defiant, hard, ironic, mephistophelian tone have worked on people that know " expressionism ', ' youth-culture ', and other feverish expressions ? " A time of decline . . . . whoever does not confess this does not count as one of the men of his generation, and he remains a fool, a charlatan, or a pedant." Thus spake Spengler.

And then the language ! Even the severest critics had to recognize Spengler's superiority in this respect, the superiority of a man who does not want to have anything in common with aesthetes. " I love the depth and subtlety of mathematical and physical theories." " In this very century, I prophesy, the century of scientific-critical Alexandrianism, of the great harvests, of the final formulations, a new element of inwardness will arise to overthrow the will-to-victory of science." And science ? ". . . . Weary after its striving, the Western science returns to its spiritual home ", which would mean that it is turning into winter and that at the same time we do not feel the death frost in our bones.

This reminds us of the language and the author of *Zarathrustra*.

FOREIGN INTELLIGENCE

The projected International Exhibition of the Science and Art of Colour to be held in New York next January under the auspices of the Artists League is of considerable interest to psychologists.

The promoters are concerned to demonstrate the importance both of the artist and of the psychologist in the future development and applications of colour in all branches of life and industry. The following is an extract from the preliminary memorandum:

Colour has universal applications in industry. Its secrets are only half understood. The artist still has the key to those secrets and it is demonstrable that without his assistance science will never master them.

At the same time neither the scientist nor the artist is as yet aware of the work the other has been doing in the past fifty years. There are artists who have gone far beyond the scientists in their chromatic technique, and there are physical scientists and physiologists whose experimental ingenuity has placed them in other respects far in advance of those who know colour only as a sensation or an emotion.

There are at present ten main groups of specialists on colour:

1. The artist-painters, who live for the enjoyment of colour, and the interpretation of life in its terms.
2. The art-workers in other mediums than pigment, such as stained glass, tapestry, the theatre, costume, and decorators.
3. Experimenters with direct colour (coloured lights).
4. Colour experts in trades such as colour-photography, colour printing, dyes, enamels, chemicals, and in camouflage.
5. Psychologists who describe and classify visual and emotional experiences of colour; in relation to black and white, and the other sensations, especially sound. These include experimenters in colour therapy.
6. Specialists in notation who are trying to discover principles whereby colour as a whole can be standardized and provided with a language or notation of its own. These include experimenters in the translation of sound and colour for the blind and deaf respectively.

7. Historians of colour, its ethnology, development in men and animals, symbolism, language, etc.

8. Physiologists, who study the visual mechanism of the retina, rods and cones; the cortex, the emotions, the muscles, etc. as the result of stimuli by colour vibrations.

9. Physicists, who study the external stimuli which give rise to colour sensations, and their borderlands (ultra-violet, infra-red, and chemical effects), on the spectrum.

10. Makers of instruments, pigments, lighting apparatus, etc., which render further experimentation possible.

As a rule these groups work in isolation, or at most two or three together. A very casual inquiry is sufficient to show that they are ignorant of one another's results. All who are not in the art field are almost entirely out of touch with the artist. But on the artist they must depend for their final judgments and criteria, and often he has been quietly solving their problems for his own purposes.

They depend on the artist because sensitivity to colour is, in the first place, a special gift. And it is a gift which is further developed by training. This development, however, runs counter to many modern utilitarian tendencies; and is often absent where other artistic gifts are marked, particularly in certain types of musicians.

The appreciation of colour, and sensitivity to its subtleties, requires peace of mind and of environment. Receptivity cannot flourish where the practical utilization of an object, or its intellectual manipulation, is paramount. On the other hand University conditions suitable to quiet and concentration do not favour the emotional development which so often reinforces sensitivity to colour. The colourist is therefore temperamentally inclined to shun those who live in uncolourful environments, and thus, unlike the musician who has more often entered the social and intellectual milieu, he has seldom cooperated in any form of research.

Yet the artist, with his special organism, is the essential instrument both for recording colour, and for setting problems to the physicist and physiologist on whom industry in turn depends.

A Colour Exhibition covering the most recent work in these ten fields who arouse tremendous public interest and would be of the greatest value to business men and artists alike. It would help to correlate the work of artists and scientists, and to set new problems for solution by cooperation.

To give an idea of the actual organization of such an exhibition in terms of rooms or galleries, there are twelve chief divisions, each requiring separate presentations calculated to stimulate public interest by showing how our daily life is affected by colours.

1. *The Analogy of sound and colour*, colour scales, colour organs. This would help people to realize that colour is not merely patches of paint or pictures upon a wall, or even a few bright lights; but is revealed as an interrelated system of visual and emotional experience, with as many instruments (mediums) and possibilities as music itself. In music, a notation or language has made new pleasure possible, giving us the whole range of modern orchestration as contrasted with the simple instruments of the Greeks. The importance of discovering and establishing a notation for colour thus becomes obvious.

2. *Standardization*. This would show the attempts hitherto made to bring order and system into colour. Some 12,000 gradations have been found necessary, and it is now possible to order colours with absolute accuracy by cable to any part of the world. The various systems are at present extremely clumsy for purposes of display, but there are many simpler methods which would enable stores to show their coloured fabrics with ease and emphasis.

3. *Psychology*. Very little is publicly known of the remarkable studies of after-images, the colours which are seen with the eyes closed after looking at any particular colour. The effects of these images upon what we see, as well as the influence of one colour on another when several colours are side by side, cause unexpected and disconcerting results, with many important educational applications. Physiological theory. Models of the eye. Types of colour vision.

4. *Hospitals*. A great deal of psychological work has been done on the emotional effects of colour, but little of this is known to practical medical men or to those concerned with the building of hospitals. In particular, the possibilities of adjusting the colour of a room, by lighting as well as by paint, to the patient's mood have been demonstrated. The same is true of asylums; and of factories and schools where output and uptake can be greatly influenced by colour stimulation.

5. *Churches*. Colour symbolism, and the effects of colour on devotion, have an elaborate tradition almost unknown in America, even by the Roman Catholic Church.

6. *Stage Lighting*. Atmospheric lights versus spotlights; direct systematic lights. Illusions. Rest for adaptation. Shop window displays.

7. *Architecture*. Outside of houses; distance. Lighting of high buildings. Sculpture, coloured and lit.

8. *Interior Decoration*. Colour schemes. Changes of colour

instead of changes of furniture are inexpensive. Coloured lighting for interiors. Sunlight and daylight lighting. Materials and fabrics. Precious stones. Coloured liquids. Metals.

9. *Trades affected by Colour*. Dyeing, Printing, Films, Photography, Enamels, Textiles. Recent developments in these, and the bearing of standardization and theory on their future with emphasis on the need for artistic sensibility in appreciating the subtleties involved.

10. *Painting*. The influence of science on the art of the painter and of art in colour theory, illustrated by the work of Chevreul on the Gobelin tapestries, the use of special systems by the old masters now lost; problems of Eastern colour; Chinese theory; chemistry of pigments; restoration.

11. *The Spectrum*. The work of the physicists since Newton has been very dramatic, but few artists and hardly any of the general public have ever seen the spectrum, or its many laboratory developments; ultra-violet, etc.

12. *Animals, Colour Blindness*. The development of colour vision in animals, with diagrams of the colour world at different states of evolution. Colour blindness and traffic dangers. Defective tests at present in vogue. Animal coloration. Colour wheels, coloured tops, kaleidoscopes. Colour in education.

Mrs. Hunt, the President of the Artists' League, will attend the League of Nations Conferences on the artist in relation to industry this summer at Geneva, and has secured promises of cooperation from a number of colourists, artists, architects, doctors, publicists, producers, decorators, contractors, and manufacturers, both in Europe and America, which already insure a public success. She also has the support and confidence of a number of the most eminent educationists, scientists, and savants in the chief countries of Europe, and *Psyche* will be glad to forward to her any suggestions for the more effective realization of the above programme.

RUSSIA.

Psychologists will do well to take note of the developments announced from Moscow and Leningrad under the influence of Professor Pavlov. Thus we learn from the *Bulletin* of the Pavlov Russian Information Bureau (2819 Connecticut Avenue, N.W. Washington that Pavlov himself has published a new volume on the functions of the Brain, and that Professor Krasnogorsky, of the Leningrad Medical Institute, is at present experimenting with the tudy of the human higher nervous activity after the method of Pavlov. e experiments were made with children between the ages of

3 and 12. It was found possible to develop in the human organism a conditional reflex hitherto observed only among animals. For instance, by the simultaneous combination of a conditional excitement (in the shape of a working metronome) with an unconditional excitement (i.e. the dangling of a sweetmeat causing the secretion of saliva) the child acquires a conditional reflex consisting in that the child will subsequently react to the beating of the metronome in the same manner as it does to the display of the sweetmeat.

It is further stated that at the Leningrad Brain Institute a paper on telepathy was read by Dr. Tchekhovsky in which he dealt with recent experiments.

" For the purpose of these experiments two individuals had been placed in different rooms. One of them—the ' transmitter ' —gazing upon a blank sheet of paper, concentrated his whole attention on some goemetrical figure or simple design, endeavouring to visualize the image with the utmost precision. The ' receiver ', in the other room, endeavouring to think of nothing else, traced the very design on which the mind of the ' transmitter ' was concentrated.

It was found possible to transmit thought not only to an individual placed in a different room, but even in a different city. For instance, at one of the experiments the Transmitter was in Moscow and the receiver in Saratov. About 2,500 experiments had been made, which proved successful in 40% of the cases among average people, and even 70% among trained people. It was observed, among other things, that the best thought-transmitters were people of virile and energetic character. Curiously enough, the more educated the individual the better he transmits, and the worse he receives.

Dr. Tchekhovsky explains the phenomena of thought—transmission by the presence of electro-magnetic waves. The process of thinking, as demonstrated by V. M. Bekhterev, and subsequently by P. N. Lazarev is accompanied by the radiation of waves similar to those of wireless telegraphy."

SOUTH AFRICA.

The psychological aspects of crime are receiving attention in every part of the world to-day, and most recently in South Africa. Thus Mr. H. E. Norman, Probation Officer for the Witwatersrand in a paper recently published in the *South African Journal of Science*, after drawing attention to the peculiar problems of South Africa remarks that if all magistrates were compelled to qualify in a knowledge of the psychology of crime, before being appointed to sit on the bench, a very different outlook on the whole subject would soon be observable."

Crime, or anti-social acts, he points out, are abnormal, " Before trying to explain the unreasonable acts of abnormal individuals, we should first think for a moment what are the sources of normal conduct. Man constantly generates within hinself a force which impels him to action along certain more or less clearly defined lines, which are known as the human instincts—self-preservation, race perpetuation and the herd or social instinct. All conduct, if it is carefully enough analysed, can be traced back to one of these instincts, and centuries of civilizing processes have developed in man the social instinct as a greater force than all the other tendencies and inclinations. For the race, men have been taught to die, and in the interests of the race men are steadily being taught to control the terrific instinct of sex. The higher the intelligence and civilization of a man, the more willing to co-operate with the interests of the race and the better able to control the instincts of self-preservation and sex expression he will be. The possession of a high standard of intelligence and civilization is not enjoyed to an uniform degree by all men. In this country, boys and girls too often find themselves floundering through the storms of adolescence before education and home training have had a fair chance of developing reasoning power clearly enough to enable the child to understand why he should sacrifice almost irrepressible instincts to the welfare and will of the community. If this is too often the case with the normally healthy person, what of those who are not normally healthy ? For a considerable section of the people are born lacking a share of intelligence, and liable to emotional disturbances and lack of control as the result of diseases and poisons, which the human race for unknown centuries has been tainted with.

Until within the past few years it was generally assumed that all men, excepting the imbecile, the idiot and the insane, possessed enough intelligence to enjoy what we term free will, and that the person who committed anti-social acts did so of this free will and could desist from such acts if he would repent of his evil desires. However, we are now beginning to discover that part of the reason why men are inefficient in earning a livelihood or in caring for their wives and children ; why some are unemployable and become paupers and criminals ; and why women become prostitutes, is because quite a considerable section of the people are born with an inferior intelligence which handicaps them in the race of life. It is not yet known how large this section is, but I believe that nearly 1 per cent. of the entire population would be found to be incapable of managing themselves without considerable or complete assistance from the state.

There is another section of the community, scarcely yet recognized, who falls within that group to which I have referred as liable to emotional disturbances and lack of control, possessed often of quite clear perceptions of duty and responsibility. These people are subject to some abnormal functioning of mind, which gives them tendencies to irregular and troublesome conduct. Within this group I believe the drunkard falls. Delinquents from this class are the most difficult to deal with, and, even when they keep within the law, they drive their mothers to tears, their wives to distraction, and their children into industrial schools and orphanages. Scientific research into delinquency would teach us what steps, if any, are likely to be effective in treatment of this class; or, if recovery is impossible, what steps are desirable in removing the type permanently from social life."

CURRENT INTELLIGENCE

PSYCHOLOGY IN AMERICA

General.—The subject of instinct is still the storm centre of American theoretical psychology, and while those with a mechanistic bias continue to attack it, the more established representatives of the science are not at all willing to give up this concept. The most recent spokesman to come to its defence is Professor Woodworth of Columbia. The experiments which Professor McDougall has been conducting on rats, and which have been reported partly in the last number of the *British Journal of Psychology*, and partly in the *Joruna1 of Comparative Psychology* (current issue) have thrown considerable light on the subject because of the extensiveness of the investigation and the ingenious variations introduced into the experiment.

While it is true that Professor McDougall's descriptions of the results are sometimes couched in anthropocentric phraseology, thus laying his interpretations open to criticism in some quarters, there can be no doubt but that these carefully planned tests carried on for a period of years will have a far-reaching effect in helping us to understand the animal mind. The behaviour of the cat in the presence of a dead mouse as compared with that toward living mice, and its attitude toward living mice under various conditions are especially noteworthy. Many investigations have been carried out on rodents, but that conducted by Professor McDougall is particularly valuable because of the clear formulation of the problems.

Meetings. —The meeting of the experimentalists grouping themselves around Professor Titchener took place during the Easter recess at Harvard University. At these meetings, the proceedings are confined to reports of the more advanced investigations undertaken in the Eastern psychological laboratories.

Research in the Psychology of Music. —The Psychological Department of the State University of Iowa, which has developed, thanks to Professor Seashore, special facilities for the study of music from a psychological angle, announces that in connection with the Eastman School of Music, Mr. George Eastman of Rochester has made available at Iowa three fellowships yielding $800, $1,200, and $1,600 respectively, with reduced tuition, for the study of certain applications of psychology to the teaching of music.

Professor McDougall's Successor at Harvard.—While Professor Köhler of the University of Berlin, has received a call from Harvard University to fill the chair in psychology left vacant by Professor McDougall's resignation, the final arrangements have not yet been made. Professor McDougall, before taking up his new duties at Duke University, is scheduled to give a summer course at the University of California.

Professor Koffka at Smith.—Professor Koffka, of Giessen, closely identified with the *Gestalt-Theorie* in psychology has accepted the invitation of Smith College to become research professor in psychology in that institution.

New Psychoanalytic Periodical.—*Archives of Psychoanalysis* is the name of a new periodical issued quarterly and edited by Dr. L. Pierce Clark. One of the features of this publication is its almost prohibitive price—$20 per volume of four issues.

Other Publications.—The recent publications in psychology on this side of the Altantic have been of a rather wide range—from spiritualism to animal psychology and social psychology. Thus we have *The Case for and Against Psychical Belief*—a symposium of papers presented at Clark University last winter; *Mental Tests in Clinical Practice* by F. L. Wells; *Applied Psychology* by A. T. Poffenberger, who has now revised and enlarged the second edition of the work which originally was a collaboration by himself and Hollingworth; *Social Psychology Interpreted* by J. W. Sprowls; *The Mind of a Gorilla* (Nos. 1 and 2 of Genetic Psychology Monographs) by R. M. Yerkes; and *The Influence of Music* by J. M. Diserens. A tentative edition of *A Student's Dictionary of Psychological Terms* has been distributed among psychologists by the author H. B. English, of Wesleyan University. Max F. Meyer has written a book on *Abnormal Psycholgoy.*

A. A. ROBACK.

CURRENT LITERATURE

GOO, GOO.

General Theory of Value. By RALPH BARTON PERRY. (Longmans, 1926. 25/-).

Philosophy of the Recent Past. By RALPH BARTON PERRY. (Scribners. 1926. 8/6).

Fourteen years ago Professor Perry was one of a group of American philosophers who subscribed to that strange form of neo-Platonism then being rehatched in Cambridge, Eng. and Cambridge, Mass. The nest was feathered with mathematical hypostatizations now long abandoned ; but subsistent entities and transcendent essences have clung to most of the doctrines which have since been favoured even by the neo-realists who have travelled farthest in other directions.

The Good, the Beautiful, and the True were once the supreme Trinity of realism ; entities through whose subsistence all was right with the world. But the public never thought of it quite so abstractly, though the conflict was there just the same—

" There is no good, there is no bad, these be the whims of mortal will ;
What works one well that I call good, what harms and hurts I hold as ill.
They change with space, they shift with race, and in the veriest space of time
Each vice has worn a virtue's crown, all good been banned as sin or crime."

That was the late Sir Richard Burton's theory of value, and as a corollary his widow found it necessary to destroy most of his posthumously unpublished MSS. But he has a vigorous ally in Professor Westermarck, who has accumulated two large volumes of evidence for the defence, and the majority of modern psychologists and anthropologists.

On the other side we have Carlyle, with " the eternal truths and rights of things, fixed as mathematics, inherent in the nature of man and the world," and the adherents of all the religions and most of the philosophies derived from them, though Professor G. E. Moore is nowadays most frequently cited as a witness.

There are two considerations which have kept the problem alive of recent years in spite of the firm convictions of both groups of disputants, and which justified a further attack. In the first place it is obvious that there is a symbolic difficulty—verbal formulations are standing between us and the clarity we desire. Secondly there are the findings of modern psychology, all of which are subsequent to the last great Value-probe,—that of Jeremy Bentham. In America the relative weakness of any so-called philosophical tradition has enabled scientifically minded persons to profit by psychological developments, but there has been no intensive study of the verbal intricacies in which European thought has become entangled.

When, therefore, some two years ago, I. A. Richards offered us an analysis of value from the standpoint of literary criticism (i.e., What is a poem, what is good poetry, what is great literature ?), he succeeded in clearing the air for most of those who could follow an argument. Many minor poets and most mystics failed to stay the course, but their resentment was rather general—i.e., antipathy to scientific analysis as such—than specifically directed against their first encounter with it in *The Principles of Literary Criticism*. Apart from his original application of linguistic canons, Mr. Richards was chiefly concerned with the psychological reinterpretation of a *poem* in terms of the impulses aroused, of the *expert* in terms of adequate experience and organization, and of *value* in terms of desire (inhibition, conflict, equilibrium). In Professor Perry's book we find the same psychological approach, with approximately the same conclusions.

The major portion of any critique of current theories of value is necessarily occupied with preliminaries. The biological approach has to be justified, absolutes gainsaid, behaviorism surpassed, social substantiations disentegrated—all of which Professor Perry admirably achieves. The positive outcome is small and could by adequately presented in less than seventy of these seven hundred pages. Like Mr. Richards, Professor Perry rehabilitates Bentham (in terms of desire) and deliberately adopts what Dr. Moore regarded as the " naturalistic fallacy." Like him, as we have seen, he offers us an account of preference in physiological terms, with special emphasis on the relation of inhibition to intensity of interest. " Intense interest tends to a total inhibition of rival interests, to total preoccupation of the organism." Similarly with regard to standardization and the appeal to the " expert,"—" one to whom a wide range of alternative instrumentalities is known, and who is enabled by his experience and discrimination to grade them in an order of utility."

He is at a disadvantage, however, in maintaining a traditional attitude to the problem of signs. He is apparently still prepared to endorse, though somewhat equivocally, followers of Husserl like Mr. Swabey, who regard meaning as an "ideal essence." In the eyes of psychological fundamentalists, therefore, he seems constantly to be handling difficulties that are primarily linguistic with the wrong technique. It is clear, too, that he has not in this work laid all his metaphysical cards on the table; how much he keeps up his sleeve can best be gathered from his tendency to deal solely in futures directly axiological ultimates come under discussion.

Moreover, unlike Mr. Richards, Professor Perry is not content with a good play. He also demands a happy ending. He might have released his offspring on the twenty-first anniversary of Chapter I with an exhortation. But Chapter XXII is entitled "The Highest Good," and after an account of Harmony through Universal Love we advance towards the ramparts of eternity. Unfortunately our analysis has revealed human imperfections which make the going difficult, unless we can charter some verbal aeroplane, and it is hard to compare and measure our preferences even when we seem to agree; in other words, our interests are inharmonious and incommensurable. But we might all become benevolent and want the same thing; could we not then speak of "a will which would make all demands harmonious and commensurable if it existed?" Thereby we might be said to have combined "the facts of discord and incommensurability" with the "principles of comparative value," and we could talk, as Professor Perry proceeds to do, of "the structure and scale of the All-Benevolent Will." Such a verbal tactic is widely known as constructive thinking, and constructive thinkers are divisible into two classes (1) those who assert that only in the light of their construction has the Universe a Meaning, (2) those who identify their construction with what others call God.

Professor Perry belongs to the second class, though he is, of course, fairly clear what he is doing, and even seems to get some quiet logical amusement from the linguistic outcome of his dignitative; as when he tells us that "to conceive God as a person is both to confuse the meaning of personality, and to deny to God the right to be himself." But what will the unsophisticated divine make of the next stage, which we reach on page 689: "God is a being far exceeding and surpassing man, and yet dependent on man's moral effort," if not a very fine sermon on the reconciliation of religion and science by Harvard's greatest thinker and most stimulating lecturer? Such an outcome suggests that there is much to be said for those who derive the idea of Good from our early habit of chirping or gurgling (goo, goo) at things we like. When the whole nest or nursery gurgles, we get Goodness; later we only gurgle with the very best people (our type or our friends), and their preferences are known as The Good. This view does not readily lend itself to transcendentalism.

Professor Perry, then, is temperamentally a traditionalist, with a desire for synthesis and reconciliation, though is it gratifying to find that he has little use for Spengler and holds that the Aristotelian conception of form works best in Noah's ark. This traditionalism also appears from his survey of the *Philosophy of the Recent Past* where he has grouped under such headings as " Naturalism," " Idealism," Voluntarism," and " Realism " more than five hundred recent philosophers whose place in the record of mankind he regards as established. The account is commendably impartial and judicial, though some of us would find it difficult to explain, e.g., Mr. Bertrand Russell's philosophy without mentioning Wittgenstein or Watson. " Philosophy " is interpreted on principles which also exclude not only Einstein and Eddington but Freud and Mauthner, though much useful supplementary information is conveyed in the bibliographical footnotes. We may hope that the author is right in his view that the distinctions which have served him in delineating current tendencies may soon be outgrown. It is possible, he thinks, that philosophy is now nearing the close of a great phase that began with Descartes. Is it not also possible that with the rise of a new technique for eliminating linguistic indiscretions it may, during the course of the next half-century, vanish completely?

History and Psychology

The Human Adventure, being *The Conquest of Civilization* by James H. Breasted and *The Ordeal of Civilization* by James Harvey Robinson (Harper's, 21/- each, two volumes boxed, £2 2 0).

In attempting to account for the influence of outworn beliefs in modern life, Professor James Harvey Robinson reflects that it would have required a very shrewd prophet half a million years ago (when certain of our social traditions were being established) to have suspected that the most characteristic feature of civilization A.D. 1927 would be its victimization by the magic of words. How could it have been foreseen " that man, being a sort of ex-animal, would tend to sanctify the habits he happened to acquire "?

For the crudest survivals of our savage beliefs we have the finest names, and around the names with which we endow these cherished anachronisms cluster the tenderest emotions. Or as the greatest of our neo-historians puts it: " When we realize that this and that notion of ours is 'sacred', we may be sure that it is a childish impression which we have never carefully scrutinized."

He takes it as an instance of our so called religious beliefs, such as belief in witchcraft, or in supernatural beings, or in the Bible, and points out that though secularization,—the reduction of human affairs to earthly standards,—is one of the most important modern trends, we still have a long way to go. This suggests his final question: " Is not the moral over-rating of the past our besetting danger? "

History, in fact, which should have been the great deliverer, has hitherto been used chiefly to hold the human mind in bondage. By focussing attention on the details of religious and political strife, it has contrived to make the issues of past centuries seem important to a world which requires new adjustments and new valuations. By echoing the prejudices of historians the modern journalist, who has usually been trained in their schools, continues to foster these same untoward interests. The magazines follow suit, because writing month by month is a profession, and efficient writers tend to rise from the ranks of the historico-literary group more naturally than from those of the working scientists. And so the vicious circle is completed.

Meanwhile there is a new world growing up beside the old, the creation of science, and particularly of psychology, and to this new world the " new history " is making its appeal. *Ancient Greece at Work*, by Professor Glotz of the Sorbonne, is in some respects the most notable achievement of the new method; but writers like Eileen Power, M. Dorothy George, E. A. Burtt, Montague Summers, and H. E. Barnes are, each in a different way, helping to break down barriers and undermine traditional solidifications.

History, for Professor Robinson, should become " the sovereign solvent of prejudices ", a sort of *aqua regia* which loosens things up, gives our thinking its necessary freedom, and enables us to attain intellectual and moral majority. To many, his seven hundred and fifty pages will seem too full of information in the orthodox sense,—too full of wars and the intrigues of governments which led up to them,—to justify the appeal to a general public. But the essentials are there too, and in the final chapter even the more belligerent sections are partly justified. For they can be regarded as serving to point a moral: " the doom of war may possibly be near at hand." But it may be that those who have not read history aright will need one more lesson!

> Perhaps if New York, London, Paris, Berlin, and Rome could be shattered by means now in hand and their peaceful inhabitants suffocated, it might bring the rest of mankind into a chastened frame of mind suitable to an honest reconsideration of the implications of war as now practiced.

It was the great Chinese thinker, Lao Tze, who said, "Comprehend the ways of the past wherewith to master the things of the present."

And the secret of the new historians as a body lies in their application of another of Lao Tze's most famous maxims: "Contemplate a difficulty when it is easy; manage a great thing when it is small." They show us our present difficulties in less complicated settings. We begin with the simplest forms of human ineptitude, and at the end it is our own fault if we do not realize quite clearly that we are still inevitably inept. At any rate we shall not flatter ourselves unduly on our heritage, however greatly we admire the faith which kept our ancestors battling with the darkness. For the children of this generation who claim also to be the children of light, the historian is gradually rising from the rôle of recorder to that of teacher, and it was also a Chinese sage, Confucius, who remarked: "He, only, who familiarizes himself with the old and thereby understands the new is fit to be a teacher." This was in the early part of the fifth century B.C., well before history itself began for most English teachers of the last hundred years.

The new historians are certainly ready to face facts, and to examine the ex-animal without undue sentiment. That is the most notable impression with which we emerge from Professor Robinson's study of the story of civilization from the decline and disintegration of the Roman Empire, though it is only fair to add that, in substance, it is merely a reprint of his text-book, *Mediaeval and Modern Times*. For the earlier ages the publishers have provided a uniform survey by a revision of Professor Breasted's *Ancient Times*, also originally designed as a text-book, though recognized, explicitly by President Roosevelt and incidentally by subsequent historians, as excellent reading for adults.

It is gratifying to find that neither of these authors lends any support to such attempts at grandiloquent generalizations as those with which Spengler and others have seduced hasty reviewers. Moreover, without a sense of humour, however grim, the historian will remain the lost soul whom the new history is endeavouring to displace. In education and in public esteem, perhaps even in the research which goes before the writing of history, nothing is so necessary as the encouragement of the school to which these two masters of modern technique belong. C. K. O.

RACE TO-DAY AND TOMORROW

The Racial Basis of Civilization : A critique of the Nordic doctrine, by FRANK H. HANKINS (Knopf, 7/6).

The time was ripe for an authoritative survey of the racial controversy, by someone familiar both with psychological and ethnological researches. Moved to wrath by the writings of Burgess, Madison, Grant, McDougall, and Stoddard, Professor Hankins has made a critical examination of the evidence and assumptions of the Nordicists. Returning from the funeral he proceeds to discuss the nature of the race as such, the idea of pure races, the psychology of racial differences, race equality, race mixture,—and the future.

By judicious steps we are led to the very natural conclusion that race crossing as such is not biologically injurious. Rather does it widen variability and at least temporarily enhance physical and mental vigour. All the important races are of hybrid origin. Many of the men of genius of Western Europe were demonstrably hybrids. The Old Americans were hybrids at the start, and the later immigrants who are gradually absorbing them have brought with them musical, artistic and literary capacities of which the Old American stock was relatively poor. Mulattoes are superior to negroes in intelligence, and many of them are superior in their biological inheritance to millions of white citizens. And so forth, until it becomes clear even to the least prophetic that the apostles of Nordicism will in future find their work cut out in more senses than one.

Professor Hankins is able to award the Nordics if any, quite a handsome palm for their share in building up the civilization which had its outcome in the Great War. His book is admirably documented from every angle, though it is odd that Professor Hankins cites nothing more fundamental than Bean and Todd or the cranial capacity of negroes.

Racial problems and prejudices are likely to play so important a part in the future of the world during the next decade that new Departments might well be created to cope with the situation. And any nation might find in Professor Hankins an ideal chief for such a Department. He is high-souled, broad-minded, and clear-headed ; moreover, he has a sense of humour and a vigorous pen. Few European Ministers have possessed such qualifications ; whence the social troubles of the Old World. Everywhere there are barriers which can be removed only by science, education, and diplomacy.

A. M.

SEX IN HISTORY

A birdseye view of modern history would show us that the forces of conservation have put up five major fights in the last five hundred years ; against the motions of the planets, the inroads of republicanism, the natural genesis of language, the gradual origin of species, the arboreal descent of man. What will be the next great clash ? " Probably in the field of sex and sex behaviour," replies Professor Barnes of Smith University, in his introduction to *Sex Expression in Literature*, by V. F. Calverton (Boni and Liveright, 1926, 10/6). Mr. Calverton prepares us to take part in the struggle by offering a radical survey of the literary field in ten sections, the last of which brings us right up to date with the story of " Hatrack ". But why does Professor Barnes allow him to describe Henry Van Dyke as " the anachronistic Galilean " ? Gallio would probably have cared very much.

Further ammunition for either side will be found in the two volumes of Wilhelm Bölsche's *Love-life in Nature* which has been a popular classic in Germany for nearly twenty years. The author, an industrious Rhineland journalist already known to English readers for his biography of the late Ernst Haeckel, confesses that he has deliberately given the floor to humour when having to deal with subjects that the faint hearted call " extremely delicate ". Though some readers will feel inclined to show him the door when the floor is thus occupied, and others, who recall the dexterous Gallic cynicism of Remy de Gourmont, will deplore his tendency to wallow in sentimental rhetoric on the slightest provocation, we are given detailed and original survey of the courtship and nuptials of every variety of animal from the Salamander to the Solomon Islander.

In this field as in that of the more general social relationships, it is a cruel irony that just as the importance of comparative study is becoming recognized, the material of the science is vanishing. Ethnology, in particular, is still in its infancy. As was revealed in the recent *Psyche* debate, the authorities are still undecided as to whether civilization is contagious. It was the conversion of the late Dr. W. H. R. Rivers to the theory of Professor Elliot Smith, who derives all culture from Egypt, that brought the controversy into the limelight ; for on the death of Dr. Rivers four years ago, the publication of his works *Conflict and Dream*, and *Psychology and Politics*, and *Medicine, Magic and Religion* made clear the importance of the new diffusionist movement. The essential documents have, however, hitherto been lacking or inaccessible, but they have just been made available by the publication of Dr. Rivers' collected essays under the title *Psychology and Ethnology* (Kegan Paul, 1926, 15/-) . As an example of the careful work done by those influenced by Dr. Rivers may be mentioned Mr. G. C. Wheeler's *Mono-Alu Folklore* (Routledge, 1926, 21/-) where eighty tales from the Western Solomon Islands are recorded, translated, and explained. Judged by modern standards it would be impossible to imagine a more pointless collection of stories, but as examples of the material on which linguists and ethnologists love to try their teeth they are probably unique.

Readings in Abnormal Psychology and Mental Hygiene, Edited by W. S. TAYLOR, Professor of Psychology in Smith College, with an Introduction by J. JASTROW. (D. Appleton and Company, New York, 1926. Pp. XXXIII × 789. 04.00)

It was not easy for the reviewer to become reconciled to books of readings; how a collection of scraps could be used as a text has always been more or less of a puzzle to him. But Professor Taylor's *Readings in Abnormal Psychology and Mental Hygiene* does seem an excellent and well-knit source book of a comprehensive range. The selections in many cases are brief, but the sequence in which they are arranged is so natural, that they sometimes give the impression of having been written by the same author in a different mood. Professor Taylor in his more than two hundred selections has covered the whole field of abnormal psychology from its general foundations to problems of personality and character. Foreign language literature is represented but slightly; Janet, Mosso, Moll, Bianchi, and Jung dividing the honours. Perhaps the American and to some extent the British writers have contributed most to this field, but certainly the value of the volume would have been enhanced by a more international point of view.

On the other hand, this book of *Readings* has several features which are especially welcome. Aside from the suggestive preface by Professor Jastrow, there are to be noted the illuminating footnotes by the compiler, the references at the end of each chapter, the carefully selected bibliography, and the fairly complete index.

What characterizes the book as a whole is the painstakingness with which it was compiled. It is evident that the editor has digested and assimilated the many selections before including them. Care and judiciousness have been exercised in a large measure even with regard to details. Perhaps a glossary would have made the volume even more serviceable. On page 552, for instance, the term " entopic perceptions " employed by Jung is obscure.

To quarrel with Professor Taylor for including certain passages and not others would be futile, if not unfair. It is sufficient to note that he was following a consistent plan, but it is hoped that in a later edition, some of the recent German, Italian, and Russian views will find a place, even if at the expense of some selections by American authors.

A. A. R.